

U.S. ENVIRONMENTAL PROTECTION AGENCY

**DIVING PROGRAM  
OPERATING (SAFETY) MANUAL**  
(Revision 2.1)

Office of Administration and Resources Management  
Safety, Health and Environmental Management Division

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## DIVE PROGRAM POLICY

### A. PURPOSE

This policy chapter prescribes the administration and safety rules for the Environmental Protection Agency Underwater/Diving Safety Management Program. Federal Law requires that individual underwater activities (diving) conducted in performance of any employment condition must conform with OSHA regulations 29 CFR Part 1910 -- OSH Standards; Subpart T -- Commercial Diving Operations. The U.S. EPA has opted, as the basis for its policy, to conduct its diving operation in accordance with the scientific diving exemption as codified in that document.

This directive sets forth the Environmental Protection Agency's (EPA or Agency) policy for minimizing its worker's occupational hazards to the underwater environment. Divers must be aware of the additional underwater specific related hazards such as drowning, near-drowning and the hyperbaric illnesses which including nitrogen narcosis, decompression sickness (DCS), air embolism, oxygen toxicity and other ancillary health and safety issues.

The Program's objectives include compliance with applicable federal, state and local governmental laws, regulations, guidelines and Executive Orders; incorporation of appropriate elements of nationally recognized consensus standards; and effective use of the wide range of both internal and external resources and expertise available to the EPA.

Standard Operating Practices (SOPs), maintained under this Program in other documents, establish the general approaches and work practices which are implemented at the operations level to achieve the various requirements of the Program in laboratory, field, and other settings.

Standard Methods (SMs), maintained under the SOP's in separate documents, detail the specific procedures and techniques which are employed in the conduct of certain work activities.

The Program, and its associated SOPs and SMs, incorporate nationally accepted and consistent means and methods for planning and conducting underwater and diving activities to minimize the potential hazards associated with these activities. To efficiently manage EPA's dive program, the DSB will create, revise, and delete SOP's and SM's using this document, the Program's Diving Operating (Safety) Manual. The Manual is considered separable from the Directorates Policy and Program document and outside of the revision process for that document. SOPs and SMs will be reviewed at the annual meeting of the DSB, and the Safety Health and Environmental Management Division (SHEMD) will be informed of the Board's action in the annual report of the meeting. Lists of the current SOPs and SMs are contained in [TAB VIII].

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An operating principle of the Program is to demonstrate continuous and measurable improvement in its management and operations, using Total Quality Management (TQM) processes.

## B. BACKGROUND

This National Underwater/Diving Safety Management Program, and its associated SOPs and SMs, address various aspects of EPA workers' protection from job-related hazards such as might typically be found at land based EPA work sites as well as those specific to the underwater environment (such as immersion in chemically and/or biologically contaminated waters) and hyperbaric induced illnesses (such as DCS or air embolisms) in accordance with the omnibus SHEMP Order. A Memorandum of Understanding (MOU) provides for management of the Program by the Office of Administration (OA) and daily administration by the Program's Chairman of the Diving Safety Board (DSB). The MOU affirms the authority of the Safety, Health and Environmental Management Division (SHEMD) for overall Program administration, and formalizes the relationship between the DSB and SHEMD, wherein the SHEMD has Program policy authority and the DSB provides Program technical assistance and support but retains some independence to ensure administrative or technical demands do not unduly influence or require field personnel to perform operations with unreasonable risk.

## C. POLICY

It is the Policy of the Agency to maintain adequate protection for its employees, property, and those for whom it has a responsibility. As for any employer, it is the Agency's responsibility to limit its workers' exposure of occupational hazards with reasonable risk. This document focuses attention to the risk of injury or health in diving and other underwater hazards to fall within the limits prescribed by underwater diving certifying entities for no-decompression diving. It is the Policy of the Agency to maintain adequate protection for its employees, property, and those for whom it has a responsibility, and to limit occupational exposure to diving related injuries and other underwater hazards.

The Agency maintains a Program which establishes the organizational structure, managerial functions, technical framework, safe dive limits system, and other elements through which this policy is effected. Standard Operating Procedures and Standard Methods promulgated under this Chapter establish general approaches and work practices, as well as specific procedures and techniques, to achieve Program requirements in all operational settings. It must be explicitly stated here that this document is the policy by which all EPA employees conduct all diving operations. These operations must fall within the limits prescribed by underwater certifying entities (e.g., EPA, NOAA, U.S. Navy and, to the extent appropriate, the other certifying agencies and organizations). By issuance of this Diving Safety Manual, the DSB reserves the need and right to maintain a set of operating rules, guidelines, procedures and methods as provided in the Appendices of this Manual. As required by



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OSHA under the rules for "Scientific Diving", this manual is maintained by the DSB for autonomous guidance of its operations.

#### D. SCOPE

This Manual and the parent program and policy document apply to all EPA employees engaged in underwater activities using compressed gas (e.g., air) as the breathing medium in the self-contained or surface-supplied mode and shall be administered following the guidance of the EPA's basic policies. This document is the policy by which EPA employees conduct diving operations. The term "employee(s)" includes full-time, part-time, temporary, and permanent EPA employees; enrollee(s) in the EPA's Senior Environmental Employment (SEE) Program; EPA stay-in-school program participant(s); intern(s) and fellow(s) assigned to the EPA and others designated on a case-by-case basis by the Director SHEMD. In addition, the Policy and Program requires that contractors and other organizations conducting diving operations at EPA controlled sites or conducting dives under EPA supervision, do so in accordance with the EPA Policy.

(or... Contractors, who are at a minimum EPA certified working divers, who routinely participate as members of an EPA dive unit, and whose activities fall clearly under the data gathering criterion of the OSHA scientific diving exemption (see p. I-5), shall conduct their dives in accordance with this policy. Contractors, whose work is clearly of a commercial (??) nature, e.g., drum search and recovery, shall conduct their dives in accordance with OSHA Commercial Diving Standard. In any case, the Agency has the responsibility for imposing and enforcing appropriate safety standards for all personnel at a multi-employer work site, such as a Superfund remediation site, that is under its control.

##### 1. Federal Regulations.

The directives set forth here and in the parent document to this Manual, (i.e., Policy and Program) are not intended to apply to other federal, state or local governmental agencies or contract personnel. However, the employees or agents of such agencies, when performing duties at EPA facilities or at EPA-controlled sites working as members of an EPA dive unit, are required to comply with:

- the more conservative of the employee's organization dive regulations or the EPA's dive safety policy and program,
- other sections of the Program as directed by the Unit Diving Officer (UDO) or local SHEMP Manager, and
- submission of the dive plan and scope of work, approved by the employee's office, to the office of EPA that hired the employee (the local UDO may review the dive plan if requested).

Employees or agents of other government agencies conducting diving operations with the EPA, unless covered under a specific reciprocity agreement between that agency

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and the EPA, must follow the policy and procedures required by their own organization. The employees of contractors, grantees, and other organizations having agreements with the EPA are required to comply with OSHA regulations for commercial diving or with the scientific diving exemption (provided below) under the auspices of their own organization. The diver's direct employer is required by OSHA to have a written program ensuring compliance under either qualification.

Contractors, grantees, and organizations with which the EPA has agreements must comply with applicable federal, state, and local laws and regulations pertaining to underwater diving. Among other requirements are those mandated in the sections below. Two principal federal agencies regulate and governing diving operations, OSHA and the U.S. Coast Guard as indicted below:

- Title 29 -- Labor; Subtitle B; Chapter XVII -- OSHA; Part 1910 -- OSH Standards; Subpart T -- Commercial Diving Operations and Appendix B to Subpart T - Guidelines For Scientific Diving, and
- Title 46 -- Shipping; Chapter I; U.S. Coast Guard; Subchapter V -- Marine OSH Standards; Part 197; Subpart B -- Commercial Diving Operations.

## 2. Scientific Diving Requirements/Prohibitions.

Both Federal Regulations have exemptions for diving operations conducted solely for scientific purposes. The standards as indicated below allow diving for observation or research and exclude any operation which may require strenuous activity or activities usually associated with commercial diving operations.

29 CFR Part 1910 exempts scientific diving under the following conditions:

### § 1910.401 Scope and Application.

(a) ...

(2) ... However, this standard does not apply to any diving operation:...

(iv) Defined as scientific diving and which is under the direction and control of a diving program containing at least the following elements:

(A) Diving safety manual which includes at a minimum: Procedures covering all diving operations specific to the program; procedures for emergency care, including recompression and evacuation; and criteria for diver training and certification.

(B) Diving control (safety) board, with the majority of its members being active divers, which shall at a minimum have the authority to: Approve and monitor diving projects; review and revise the diving safety manual; assure compliance with the manual; certify the depths to which a diver has been trained; take disciplinary action for unsafe practices; and, assure adherence to the buddy system (a diver is accompanied by and is in continuous contact with another diver in the water) for SCUBA diving.

...

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§ 1910.402 Definitions.

...

"Scientific diving" means diving performed solely as a part of a scientific, research, or educational activity by employees whose sole purpose for diving is to perform scientific research tasks. Scientific diving does not include performing any tasks usually associated with commercial diving such as: placing or removing heavy objects underwater; inspection of pipelines and similar objects; construction; demolition; cutting or welding; or the use of explosives.

...

#### Appendix B to Subpart T - Guidelines for Scientific Diving

This appendix contains guidelines that will be used in conjunction with § 1910.401(a)(2)(iv) to determine those scientific diving programs which are exempt from the requirements for commercial diving. The guidelines are as follows:

1. The Diving Control Board consists of a majority of active divers and has autonomous and absolute authority over the scientific diving program's operation.
2. The purpose of the project using scientific diving is the advancement of science, therefore, information and data resulting from the project are non-proprietary.
3. The tasks of a scientific diver are those of an observer and data gatherer. Construction and trouble-shooting tasks traditionally associated with commercial diving are not included within scientific diving.
4. Scientific divers, based on the nature of their activities, must use scientific expertise in studying the underwater environment and, therefore, are scientists or scientists in training.

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DIVE PROGRAM ORGANIZATION

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A. EPA Diving Safety Board (DSB).

1. Policy/Procedure.

- a. The EPA Diving Safety Board (DSB) shall be composed of the Unit Diving Officers (UDOs) as voting members, representing one vote from each Region, Headquarters Office, or Laboratory maintaining an operating Diving Unit.
- b. Non-voting consultants, where necessary, may be invited to provide essential expertise on matters relating to the Diving Program.
- c. All recommendations for revisions of the policy, diving rules or other requirements associated with this program must be agreed upon by consensus of the voting members of the DSB.
- d. The dealings and recommendations of the DSB may be represented by its Officers (i.e., Chairman, Training Director and the Technical Director) with the concurrence of the majority of the DSB.
- e. As determined by the DSB Chairperson, all voting members of the DSB will be polled if the business at hand can be delayed and the absent vote(s) would determined the decision.

2. Responsibilities.

The DSB shall make recommendations and be responsible for:

- a. recommending policy and changes in operating procedures within EPA that will ensure a safe and efficient diving program;
- b. reviewing existing policies, procedures, and training needs to ensure a continually high level of technical skills and knowledge throughout the EPA Diving Program;
- c. planning, programming, and directing policy pertaining to the initial certification of new divers and refresher training of experienced divers in cooperation with the EPA Diving Program's Technical and Training Directors;
- d. recommending changes in operating policy to SHEMD through the Chairman of the DSB;
- e. serving as an appeal board in cases where a diver's certification has been suspended;
- f. planning, programming, and directing diver workshops, seminars, and other activities considered essential to maintaining a high level of competency among divers;

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- g. reviewing EPA diving accidents or potentially dangerous incidents and reporting on preventive measures to ensure safe diving;
- h. recommending to SHEMD the eligible persons to fill the vacancy of Chairman of the DSB;
- i. reviewing all budgeted, advanced diving projects, or directing the Chairman of the DSB to establish and chair an approved review committee for such projects;
- j. advising SHEMD, directly, of any policies, procedures, or actions that affect the safety or efficiency of EPA diving activities;
- k. reviewing EPA contracts and cooperative agreements, as necessary, which involve diving;
- l. reviewing diving reciprocity agreements and, when necessary, dive plans for non-EPA divers when funded and supervised by EPA; and
- m. submitting comments on these activities to SHEMD.

B. DSB Chairman.

1. Policy/Procedure.

- a. The Chairperson of the DSB shall be the principal contact within EPA for diving operational policy and safety procedures.
- b. The DSB Chairman shall be a trained diver with a wide range of experience and be:
  - (1) a currently certified EPA Divemaster; and
  - (2) capable of carrying out the responsibilities listed below.
- c. The DSB Chairman will be elected by simple majority from among the members of the DSB to serve a term of three years.

2. Responsibilities.

The Chairperson of the DSB shall make recommendations to allocate sufficient resources to provide technical assistance and support to the SHEMD, Regions, Laboratories, and other operating units to ensure implementation, management and maintenance of Program policies, standards, protocols, priorities, and evaluation activities in accordance with the MOU between SHEMD and the DSB, and the statutes, regulations, and guidelines identified below. The EPA DSB Chair, nominated from the membership of the DSB and confirmed by SHEMD, shall be responsible for:

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- a. conducting an annual review with the EPA Diving Safety Board of all EPA diving operations during the preceding calendar year and submitting an annual report at the end of the calendar year to SHEMD;
- b. establishing procedures for the Unit Diving Officers and the EPA DSB Technical Director to conduct safety inspections of each diving unit on an annual basis;
- c. ensuring that such inspections of each diving unit are accomplished;
- d. reviewing all budgeted diving projects;
- e. reviewing and taking appropriate action on recommendations for changes in operating policy formulated by the EPA Diving Safety Board and/or SHEMD;
- f. reviewing all EPA diving accidents or potentially dangerous incidents and issuing reports on preventive measures to ensure safe diving;
- g. with the concurrence of the Technical and Training Directors, approving the use of specialized types of diving apparatus or gas mixtures, other than open circuit SCUBA with air or oxygen enriched air;
- h. developing diving reciprocity agreements between EPA and other federal and state agencies, colleges and universities, private institutions, or any other entity;
- i. remaining abreast of new diving techniques and innovations; and
- j. establishing and chairing such budgeted advanced diving project review committees as may be directed and approved by SHEMD.

C. DSB Technical Director.

1. Policy/Procedure.

- a. The DSB shall appoint an EPA Technical Director who will be the principal contact with the DSB Chairman for safety, equipment, and technical matters.
- b. The DSB Technical Director shall be a currently certified EPA Diver capable of carrying out the responsibilities listed below. This requires the Technical Director to remain current in the knowledge and understanding of industry standards, practices and concerns; diving medicine to the extent necessary to provide guidance on safe diving practices; and diving technology (e.g., by attendance of annual diving technology show or other technical meetings).



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- c. The DSB Technical Director will be elected by a simple majority from among the members of the DSB to serve a term of three years.

2. Responsibilities.

The Technical Director shall be responsible to the Chairman of the DSB for:

- a. providing technical content and recording of EPA diving unit safety inspections;
- b. conducting diving unit safety inspections as designated by the Chairman of the DSB or as requested by the unit diving officers;
- c. managing the breathing gas quality assurance program (i.e., compressor system recordkeeping, routine analyses, and audit program);
- d. coordinating diving accident reporting with appropriate EPA safety managers.
- e. reviewing new technologies which may be incorporated into the EPA's Diving Program;
- f. reviewing all EPA diving accidents or potentially dangerous incidents and issuing reports on preventive measures to ensure safe diving;
- g. reviewing the use of specialized types of diving apparatus or gas mixtures, other than open circuit SCUBA with air or oxygen enriched air; and
- h. actively researching new diving techniques and innovations.

D. DSB Training Director.

1. Policy/Procedure.

- a. The DSB shall appoint an EPA Training Director from its membership who will be the principal contact with the DSB Chairman for training, certification and diver qualification. In addition, the Training Director will be an additional resource on issues of safety, equipment, and technical diving matters.
- b. The Training Director shall be a currently certified EPA Diver capable of carrying out the responsibilities listed below. The Training Director shall be experienced in the area(s) of instruction as required by the duties involved in the EPA's diving program and/or as recommended by the DSB. The Training Director shall be capable of coordinating the training activities for the diver qualification, certification and safety training programs.

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- c. The DSB Training Director will be elected by simple majority from the DSB membership to serve an indefinite term.

2. Responsibilities.

The Training Director shall be responsible to the Chairman of the DSB for:

- a. providing and coordinating all EPA Working Diver and Divemaster Training courses for EPA employees, certifying individuals to the EPA Working Diver and Divemaster levels, maintaining training records and for issuing Letters of Certification (see Appendix 4) in accordance with this manual;
- b. managing these courses with the advice and assistance of the EPA Diving Safety Board by discussing possible private (contract) sources of trainers and by delegating various training course responsibilities to the EPA UDOs who are able to participate in the course;
- c. coordinating contracting activities with SHEMD for the purpose of providing appropriate trainers for these courses;
- d. remaining abreast of new diving techniques and innovations;
- e. with the concurrence of the DSB Chairman, approving the use of specialized types of diving apparatus or gas mixtures, other than open circuit SCUBA; and
- f. providing a written summary of training activities to the Chairman of the DSB, thirty days prior to the DSBs annual meeting for inclusion in the DSBs annual report to SHEMD.

E. Unit Diving Officer (UDO).

1. Policy/Procedure.

- a. The UDO must be capable of managing the unit's diving assignments, personnel, and equipment resources along with the reporting functions indicated in this policy chapter. The Director of each Laboratory, as appropriate that conducts diving operations shall recommend to the EPA DSB Chairman, a Unit Diving Officer (UDO) for appointment. The UDO candidate nomination may be made in consultation with members of the DSB, who may have a better understanding of a candidate's capabilities to meet the functional requirements.
- b. The Unit Diving Officer shall be a currently certified EPA Diver capable of carrying out the responsibilities listed below. This requires the UDO to be knowledgeable of industry standards, practices and concerns; diving medicine

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to the extent necessary to provide guidance on safe diving practices; and diving technology.

- c. The Unit Diving Officer is responsible for reporting to the Diving Safety Board, on a quarterly basis, a summary of all diving activities, accidents, incidents, and other information as requested by the Chairman.

2. Responsibilities.

The Unit Diving Officers (UDO) shall make up EPA's Diving Safety Board representing the Regional, Headquarters Offices, and Laboratories and shall be responsible within the Unit for:

- a. review and maintenance of copies of all dive training and qualification records for all EPA certified divers within their Unit;
- b. maintaining current generic diving safety policies, plans and procedures;
- c. providing technical support locally in the development of site safety plans;
- d. providing managerial and technical resources for diving programs to the Unit managers and supervisors;
- e. providing, if at all possible, on-site logistical and supervisory support to the EPA Training Director for the diver training courses;
- f. conducting investigations of occurrences, accidents, and employee incidences of diving related illnesses and/or excursions in concert with the SHEMP Manager;
- g. planning, programming, directing, and reviewing the diving activities within the Unit to ensure compliance with EPA policies, procedures and standards relating to diving operations;
- h. maintaining familiarity with all diving activities within the Unit;
- i. locally conducting annual on-site diving unit inspections or appointing qualified designees to conduct such inspections and forwarding a report of such inspections to the Chairman of the DSB and the EPA Diving Program Technical Director in a timely manner;
- j. recommending to the Chairman of the DSB divers who have successfully completed the required training and are qualified for EPA certification;

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- k. advising and assisting the Training Director in planning and coordinating diver training programs leading to certification of divers to meet the various research and technical diving requirements of EPA;
- l. establishing requalification criteria within the Unit for divers whose proficiency requirements have lapsed;
- m. investigating and reporting each diving accident/incident that occurs within the Unit, in conformance with TAB III, Dive Program Elements, Section A.7, "Reporting, Investigating, and Reviewing Diving Accidents" (p. III-3); and
- n. submitting an quarterly and annual reports of all diving activities and accidents, as required, to the Chairman of the DSB.

On a local level, the UDO is responsible for:

- o. ensuring that all diving gear and accessory equipment is maintained in a safe operating condition;
- p. ensuring the maintenance of equipment files at the unit and the ship/party levels to include type, brand name, serial number, and repairs completed on compressors, tanks, regulators, depth gauges, pressure gauges, and decompression meters;
- q. ensuring that a competent Divemaster is in charge of the diving operations conducted by the unit's various ships and parties; and
- r. maintaining a file on each diver in their unit or delegating this responsibility to the ship/party Divemasters. (The file maintained on each diver shall include, but not be limited to: a complete copy of the diver's most recent medical examination report, a copy of the diver's Letter of Certification, copies of the diver's training records and copies of the individual's dive log sheets.)

F. Alternate Unit Diving Officer (UDO).

1. Policy/Procedure.

An Alternate Unit Diving Officer will be designated at the discretion of the UDO by internal memorandum to the UDO's immediate superior to temporarily assume the duties of the UDO, as provided above, in his absence. The primary responsibility is to provide coverage for administrative responsibilities in the UDO's absence.

2. Responsibilities.

(see UDO Responsibilities, above)

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G. Divemaster.

1. Policy/Procedure.

- a. The Divemaster designation is an assigned function for each diving project similar to a site supervisor. Depending on the unit organization, a Divemaster shall be assigned for each ship/work party by the Unit Diving Officer for all diving operations. In the Unit Diving Officer's or alternate UDO's absence, the EPA DSB Chair, Technical or Training Director may assign the Divemaster.
- b. The project Divemaster shall be a currently certified EPA Diver experienced in that specific type of diving and must have successfully completed the EPA Divemaster Training Course. The UDO may temporarily designate an otherwise qualified individual until such formal training is received. This designee must be scheduled for the next available EPA Divemaster Training Course.

2. Responsibilities.

Designated Divemasters are responsible for:

- a. supervising employees and divers, as appropriate, in a manner so as to ensure that their health is protected through the application of this program, and all related guidance and Directives;
- b. through observation of divers performance in the field, identify those who may be eligible for enrollment, advancement, or discharge from the program;
- c. if requested by the UDO, oversee the proper handling, use and timely replacement of critical diving equipment;
- d. joint review of diving related incidences involving their subordinates in consultation with the SHEMP Manager and the Unit Diving Officer;
- f. being aware of their divers and other workers who are diving profiles which approach the No-Decompression Limits (or Oxygen Toxicity limits for Nitrox or mixed gas profiles) and monitoring those individuals for neurological or toxic effects.

The Divemaster, or their designee, shall be in complete charge of all diving operations conducted by the ship/party, and shall be responsible for and ensure that:

- g. all diving operations are conducted safely in accordance with prescribed EPA diving safety rules and regulations;

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- h. all divers are certified, properly trained, and physically fit to perform the required diving and that the prescribed files are maintained if responsibility has been delegated by the Unit Diving Officer;
- i. all equipment is in a safe operating condition, and that the required maintenance records are maintained as directed by the Unit Diving Officer;
- j. emergency procedures are understood by all personnel before diving;
- k. an accurate log of all diving activities are maintained;
- l. all divers are monitored after each dive for symptoms of decompression sickness; and
- m. reporting immediately all diving-related accidents/incidents within their unit in conformance with TAB III, Dive Program Elements, Section A.7, "Reporting, Investigating, and Reviewing Diving Accidents" (p. III-3).

On hazardous waste sites, On-Scene Coordinators or Remedial Project Managers are ultimately responsible for the health and safety of workers. In diving operations, the designated EPA Divemaster is immediately responsible for the health and safety of divers under his control. In cases where dive operations are conducted on designated hazardous waste sites, the Divemaster again has primary responsibility. Because of the shared responsibilities, both parties shall assure implementation of this Program, all related guidance and Directives, at reporting units, establishments or workplaces.

#### H. Individual Diver (Working and Trainee).

##### 1. Policy/Procedure.

- a. Individual divers shall be certified by the EPA DSB Training Director and the DSB Chairman in accordance with the provisions of TAB IV, Diver Training and Certification, Section D, "EPA Diver Certification" (p. IV-3).
- b. Divers shall be sufficiently trained to undertake the assigned diving tasks.

##### 2. Responsibilities.

The individual divers (including the Dive Tender, as the specific dive plan requires) are responsible for:

- a. complying with the requirements established by this Program, and following Directives, Standard Operating Practices, Standard Methods, and related guidance in the performance of their work;
- b. adhering to dive safe practices in all underwater work related activities;

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- c. the proper handling, use and timely replacement of critical diving apparatus and breathing gass;
- d. maintaining good personal physical condition and a high level of diving proficiency are maintained;
- e. maintaining all personal dive equipment is in safe operating condition;
- f. ensuring diving conditions are safe; and
- g. not violating the dictates of training or diving regulations,
- h. maintaining a current individual dive log of all EPA related dives, including training and proficiency dives; and
- i. maintaining current CPR, oxygen administration, and first aid certifications.

Each diver has the responsibility and privilege to refuse to dive:

- j. if diving conditions are unsafe or unfavorable;
- k. if at any specific time the diver feels that he/she is not in good physical or mental condition for diving; or
- l. if, by diving, the diver would violate the dictates of training or applicable regulations.

The conditions and reasons for refusing to dive may be required to be documented. If requested, the incident will be reviewed by the Unit Director with the Unit Diving Officer and individual diver, and appropriate action may be taken. Any action resulting from this review may be appealed to the EPA Diving Safety Board.

## I. Dive Tender.

### 1. Policy/Procedure.

The Unit Diving Officers may appoint competent field personnel to assist in administering the divers needs in the event that qualified divers are unavailable to assist the working divers. The candidate must be trained in the equipment to be used by the divers including boat operations, if necessary, by the Unit Diving Officer or his designee. The Dive Tender is responsible for working with the in-water divers to ensure that the full support is provided as required or requested by the team. The Dive Tender's sole responsibility is assisting in the safety of the divers while preparing for, conducting and disengaging from the in-water operation.

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2. Responsibilities.

The tender may enlist the assistance of the standby diver or boat operator if necessary, to ensure the following:

- a. assist in dressing the divers,
- b. assist in tracking divers location in the water,
- c. record each diver's tank pressure before and after each dive, their bottom time, and maximum water depth;
- d. alert divers, when necessary, on the status of their bottom time via the Diver Recall Unit;
- e. advise other vessels of the diving operation and warn off boat traffic which may pose a hazard to the divers; and
- f. assist the divers in exiting the water and doffing equipment.

J. EPA Diving Medicine Specialist.

1. Policy/Procedure.

- a. The Chief, Operations Branch, SHEMD, will be responsible for appointing the Diving Medicine Specialist (DMS). Nominations may be considered from both the DSB and SHEMD. Upon the advice of the EPA DSB Chairman, the EPA Diving Medicine Specialist, appointed by the SHEMD must perform or fulfill the following roles:

- (1) be a qualified hyperbaric/diving medicine physician;
- (2) serve as a consultant to provide essential expertise on matters relating to the medical qualifications of divers.

- b. The EPA Diving Medicine Specialist will receive overall policy guidance, except for medical policy, from SHEMD, and shall make recommendations to the EPA Diving Safety Board or to its Chairman as appropriate.

- c. The credentials of the DMS must include:

- (1) certification as a physician (M.D.) licensed to practice medicine in the United States of America;
- (2) Board Certification in an established primary care specialty such as Internal Medicine, Family Practice, or Emergency Medicine;
- (3) Qualification as a hyperbaric/diving medicine physician as evidenced by specific certification as a Navy Diving Medical Officer licensed in hyperbaric medicine; or holding a certificate of additional qualification for hyperbaric/diving medicine (Board of Preventative Medicine,



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Division of Occupational Medicine), and attending courses and seminars, for continuing education, in hyperbaric/diving medicine accredited by the Undersea and Hyperbaric Medical Society (UMHS).

- (4) Certification as a diver by a recognized training organization such as U.S. Navy, YMCA, PADI, or NAUI. Additional training in scientific diving is recommended through such agencies as NOAA or the EPA.

- d. The Specialist will be provided by agreement (i.e., contract or memorandum of understanding through another department of the government) to be available for consultation to the DSB and/or SHEMD.

## 2. Responsibilities.

An EPA Diving Medicine Specialist, appointed by (and/or under contract to) the National Underwater Diving Safety Management Program Subcommittee, shall be responsible to SHEMD for:

- a. providing medical input for policy, procedures (e.g., medical evaluation criteria), and other issues that relate to the safety and health matters of divers;
- b. serving as a professional liaison with the EPA contractors providing routine medical examinations on EPA divers;
- c. reviewing all physical examinations, make final determinations regarding the ability of divers to perform their diving related duties, and submit these determinations, using the EPA Medical Evaluation Form for Divers (Appendix B, p. 7), to the respective UDOs and the DSB Chairman;
- d. reviewing or performing special consultations, disability evaluations, independent medical evaluations, etc and render an expert opinion concerning the fitness of divers;
- f. reviewing medical records pertinent to any diving related medical emergency, incident, or fatality;
- g. managing a data base that includes medical data and report at least annually to SHEMD and the DSB concerning the analysis of this data;
- h. responding to specific medical inquiries from SHEMD or the DSB;
- i. recommending changes in the medical criteria for divers;
- j. recommending changes in the medical examination process or forms for EPA divers;

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- k. making recommendations in policies and procedures which will further ensure the safety of EPA diving operations;
- l. review the appeals of individual divers who have been disqualified, permanently or temporarily due to their medical qualifications; and
- m. summarize and review the results of the annual medical examinations and provide recommendations based on the analysis to the board.

TAB III

DIVE PROGRAM ELEMENTS

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## DIVE PROGRAM ELEMENTS

### A. General Operations.

#### 1. Project Review.

Proposed diving projects involving systems or modes other than open-circuit SCUBA, and not addressed elsewhere in this Chapter must receive the approval of the EPA Diving Safety Board, or its designee, before the proposed diving activities begin. The EPA Diving Safety Board, or its designee, in reviewing and considering operational and safety-related aspects of the project shall review and consider:

- a. diver qualifications, certification, and physical condition;
- b. the availability of equipment and personnel required to complete the project;
- c. specific standard operating procedures regarding safety, methodology, and emergency procedures; and
- d. support staffing.

In the case of long-term programs other than standard SCUBA not covered elsewhere in these regulations, an EPA Diving Safety Board review shall be conducted annually or when major personnel or diving system changes occur.

#### 2. SCUBA Diving Teams.

Except under emergency conditions, the buddy system of at least two (2) divers shall always be required. When conditions are such that the probability of separation of divers is high such as low visibility, some form of direct contact, physical or visual, between divers shall be maintained. At all times, divers (especially Trainee Divers) shall be within physical or visual distance from other qualified members of the dive team in order that assistance may be easily rendered in the event trouble occurs (e.g., entanglement or out-of-air emergency). In the event that diving is shallow within a restricted area and with water conditions of low velocity and low turbidity, the buddy diver may remain at the surface fully equipped while maintaining contact (i.e., visual or U/W comm. audio) with the working diver at all times.

A Tender shall always be present to log in/out dive times, tank pressures and assist divers in and out of the water. In addition to the Tender, a fully suited, equipment ready Standby Diver (as a third member of the team) shall be present to render immediate assistance any time the UDO determines that the diving conditions may so require.

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3. Diver Proficiency.

EPA certified divers should log an average of at least two (2) diving days per month. Anytime six (6) weeks or more elapse without a dive, the diver should complete a requalifying program. Anytime three (3) months or more elapse without a dive, the diver must complete a requalifying program before resuming work dives. The Unit Diving Officer shall specify the requalifying program according to the type of diving anticipated to be conducted by the Unit. This requirement may be waived by the official in charge of the project, program, or command only during emergency conditions. A report of such waiver must be submitted to the DSB Chairman through the Unit Diving Officer for review by the EPA Diving Safety Board. Supervisors shall authorize the necessary time and payment for qualifying dives if diving is required for official program activities. Diving equipment shall be made available during non-duty hours for purposes of maintaining diver proficiency.

4. Diving by Non-EPA Certified Personnel. (see also H.2 Diving by non-EPA certified divers observing EPA Programs)

Persons not included in a reciprocity agreement must submit, in advance, evidence of diving training and full medical qualifications, as described in TAB IV Diver Training and Certification, Section C, "Physical Examinations", to the Unit Diving Officer, or their designee, who will evaluate this evidence with the standards required for EPA certification to determine equivalence with a level of EPA certification. Where sufficient doubt exists, this evidence shall be forwarded to the DSB Training Director for a decision. In all cases following medical approval, a checkout dive shall be observed by the Unit Diving Officer or their designee before the beginning of diving operations. Volunteers may be accepted under a reciprocal agreement if they are certified by NOAA. Reciprocity agreements under development with other government agencies (e.g., Dept. of Interior or DOE) may be accepted with the approval of the DSB's Chairman and/or Training Director.

5. Non-EPA Diving.

a. EPA certified divers may participate in non-EPA programs in an official capacity provided each EPA diver abides by the provisions of the EPA Diving Program Operating Manual and the National Underwater Diving Safety Management Program and that the other divers meet minimum EPA diver requirements as determined by the UDO or higher authority. Dives conducted as sanctioned activities may be included in the diver's proficiency/qualification records.

b. EPA divers participating in non-EPA activities and not representing the EPA will not be held to the standards contain herein. However, such dives may not be sanctioned by the EPA, as provided in part "c." below. EPA divers are prohibited from conducting dives which fall outside the standards, as provided in this document, when the diver is in pay or authorized travel status by the Agency.

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- c. Non-EPA dives may be considered for inclusion in the divers proficiency/qualification records only upon approval of the diver's UDO, the DSB Chairman or Training Director.

6. Diving Plans, Reports, and Logs.

Divers shall be required to log all dives. The logged information must indicate the dive location, purpose or function, maximum water depth, and bottom times as indicated in Appendix 1, Paragraph 5.

Record-keeping.

- a. The original project Dive Plans, Dive Tender's Logs, and Dive Reports will be maintained by the UDO. Topics that should be addressed in the dive plans and reports are listed in SM No. 1 Generic Dive Plans and Reports. Examples of Dive Tender's Logs are provided in SM No. 2 Dive Tender's Logs. Dive Plans should be prepared by the Divemaster for the project and signed by the UDO and, if required, by a higher local authority. Dive Reports will be signed by the project Divemaster and sent to the UDO for signature. The reports should be submitted to the UDO within five working days after completion of the dive project authorized by the dive plan.
- b. Dive Logs for each dive unit will be maintained by the UDO. The divers will provide the UDO with their dive log summaries on a semi-annual basis. The semi-annual reports of the diving activities of each unit should be provided to the Chairperson and the Technical Director of the DSB by the end of the first month after the semi-annual deadline. Topics to be addressed in the unit reports are listed in SM No. 3 Semi-annual Report of Unit Dive Training and Operations. The Chairperson and the Technical Director will ensure that an overall report of all dive unit operations is forwarded to SHEMD by the end of the second month after the semi-annual report deadline.

7. Reporting, Investigating, and Reviewing Diving Accidents.

It is the responsibility of the Regional, Office, or Laboratory Director and the Unit Diving Officer representative on the diving site to ensure that any diving accident within the Unit is promptly and properly reported in accordance with EPA regulations. The following details describe investigation, reporting, and reviewing requirements.

The immediate supervisor of the diving operation shall make the initial report on all diving accidents.

- a. All Accidents or Occupational-illness must be reported to the EPA Regional Safety Manager and by completion of the appropriate report form (reference forms CA-1; CA-16; CA-17; EPA 1440-9 and HCFA 1500) available through the Human Resources department.

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- b. Fatal Accident or Critical Injury shall be reported immediately by telephone or other rapid means to the following:
  - (1) Unit Diving Officer;
  - (2) Regional, Office, or Laboratory Director;
  - (3) DSB Chairman;
  - (4) Director, SHEMD
  
- c. All Diving Accidents and Incidents including any potential cases of decompression illness (i.e., decompression sickness or extra-alveolar air), significant equipment malfunctions, and diving emergencies shall be reported immediately. The Report routing sequence for incidences indicated as non-fatal or non-critical should be as follows:
  - (1) Divemaster. Report immediately to the Unit Diving Officer and submit a written report within seven (7) days to the Unit Diving Officer.
  
  - (2) Unit Diving Officer. Upon observing a diving accident or receiving the immediate supervisor's report of a diving accident, the Unit Diving Officer shall ensure that the supervisor of the diving operation has prepared and forwarded the necessary reports. In addition, the Unit Diving Officer shall prepare a detailed analysis and written report within ten (10) days after the date of the accident. Included in this report shall be the nature of the operation, existing conditions, personnel involved, type of equipment used, nature of injury or equipment failure, causal analysis, recommendations for prevention of a similar future accident, and any other pertinent facts. The Unit Diving Officer shall submit this report to the DSB Chairman.
  
  - (3) Regional, Office, or Laboratory Directors shall report immediately to the EPA DSB Chairman by telephone or other rapid means. Conduct a complete fact-finding investigation of each diving accident/incident, coordinate the reporting, and submit a written report within thirty (30) days to the EPA DSB Chair.
  
  - (4) The EPA DSB Chairman, EPA Technical Director, EPA Diving Medicine Specialist, and EPA Diving Safety Board shall review all diving accidents and incidents and shall report on preventive measures to ensure safe diving. If the circumstances warrant such action, they may convene a special investigation. Recommendations for changes in operating policies or procedures shall be reported to SHEMD.

In the event of a serious accident, or fatality, the Agency maintains the right and shall pursue drug testing of all key operation personnel under the Agency's drug testing protocols, as applicable.



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B. Special Equipment and Operations.

1. Nitrox Diving.  
(see TAB VIII)
2. Polluted Water Diving and Equipment Decontamination.  
(see TAB VIII)
3. High Altitude Diving (> 1000 ft.).  
(to be developed, refer to the most current version of the NOAA Diving Manual or AAUS standards for guidance)
4. Low Visibility Diving.  
(to be developed, refer to the most current version of the NOAA Diving Manual or AAUS standards for guidance)
5. Blue Water (Over-Bottom) Diving.  
(to be developed, refer to the most current version of the NOAA Diving Manual or AAUS standards for guidance)
6. Strong Current Diving.  
(to be developed, refer to the most current version of the NOAA Diving Manual or AAUS standards for guidance)
7. Underwater Communications Systems.  
(to be developed, refer to the most current version of the NOAA Diving Manual or AAUS standards for guidance)
8. Underwater Pinger/Locator.  
(to be developed, refer to the most current version of the NOAA Diving Manual or AAUS standards for guidance)

C. EPA Diving Safety.

1. Rules.  
The EPA Diving Safety Rules shall be adhered to on all diving operations. (See Appendix 1 to this Chapter.) To maintain program reciprocity goals, EPA's Underwater Diving Program closely follows that of the NOAA Program. The reader should reference the NOAA Diving Manual for more detailed information.
2. Safety Audits.  
Diving units will periodically be subjected to safety quality assurance reviews. Reviews, inspections or audits will be conducted as both internal function by the UDO and by the SHEMD Safety Audit Department. UDO's should maintain a quality

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assurance awareness of the unit's diving equipment maintenance, compressor systems and air quality, diver records, and emergency equipment.

Program Audits, involving planning, implementation, assessment, reporting, and quality improvement shall ensure that the Program management and operations functions are established, monitored, and continuously improved to limit EPA worker's occupational exposure to hyperbaric illnesses. The Audit system includes specific activities for collecting and analyzing information to indicate levels of success and effectiveness of individual Program functions. The Audit activities focus on process and outcomes, and include:

- program audits and self-assessments;
- dive incident reporting;
- quality control activities;
- operating data and reports; and
- performance standards and indicators.

A system shall be established, including Standard Methods, to measure and control the quality of the Program's products and services to ensure optimal achievement of objectives. Quality Improvement (QI) tools and activities are applied to evaluate and enhance processes, procedures, and practices of the Program. The QI component of the Program includes a self-assessment system that utilizes QA/QC data and EPA Total Quality Management techniques.

Quality Assurance activities will be conducted in accordance with the Agency's Quality Manual, based on American National Standards Institute (ANSI)/American Society for Quality Control (ASQC) national consensus standards, and the principles of TQM. Program quality requirements are detailed in a Quality Systems Standard Operating Practices document.

The Technical Director or Training Director will be responsible for conducting diving unit safety inspections as designated by the DSB Chairman or as requested by the Unit Diving Officers and managing the breathing gas quality assurance program. In addition, SHEMD will be responsible for conducting periodic audits of the various diving unit programs. All audits will be conducted following the procedures outlined in the audit checklist in Appendix 6.

### 3. Maritime Safety.

Reference: EPA National Maritime Safety Management Program.

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D. Record-keeping.

1. Diver Training.

The EPA Training Director shall maintain complete files on all divers that have completed EPA Diver Certification. This includes written tests, logs of water work, class work, and homework. --The records will be maintained by the EPA for a minimum of seven ? years following cessation of diving in the Program.--

2. Diver Medical Records.

Completed forms are maintained by the Diving Medicine Specialist at Public Health Service, Bethesda, MD. A copy of the completed evaluation form is returned to the diver. The recommendation form (Appendix B, page 7) is forwarded from the DMS to the UDO, the chairman of the DSB, and also to the Training Director for those candidates applying for the EPA Diver Training Course.

3. Dive Logs.

Maintenance of an individual diver's personal log is the responsibility of that diver. The diver's UDO is responsible for maintaining the official dive records, including the original log completed by the tender during the dive.

4. Accident/Incident Reports.

Standard EPA procedures apply for reporting and record-keeping of any work related incidents.

5. Equipment Maintenance Records.

UDOs are required to maintain the following records (or have access to those records which may be prepared by local scuba equipment maintenance specialists, e.g., a local dive shop): scuba tank VIP and hydrostatic tests, scuba valve and burst disk maintenance, scuba regulator system and submersible pressure gauge (annual maintenance and calibration), dry suit systems, surface supply systems, full face masks, hard hat/helmet systems, buoyancy compensator, and compressor maintenance. In addition, the UDO may be required to maintain records for ancillary equipment associated with the dive program, such as boat and safety equipment maintenance.

6. Project Dive Requests/Clearances.

The UDO is responsible for maintaining the records of dive plans and clearances. Each dive must be planned and submitted by the Divemaster to the UDO for approval. When the dive is completed, the plan must be signed by the Divemaster and along with the tender's log of up/down times and air pressures, the records maintained by the UDO in the project files.

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E. Medical Review.

1. Physical Evaluation.

Physical evaluation and qualification for diving will be conducted in accordance with TAB IV - "Diver Training and Certification," Part C - "Physical Examinations."

2. Biohazard Protection.

(Reference: National Biohazard Safety Management Program).

F. Emergency Planning. (To be developed)

1. Diving Accident Management.

It is required that all personnel be familiarized and be able to recognize the types and potential of injury associated with diving and it is recommended that all personnel complete training in diving accident management. Planning for diving accidents should include transportation, oxygen administration and transportation (e.g., backboarding as a potential need). It is no longer required to determine the status of a hyperbaric chamber during the planning phase, as the availability of a chamber may change while an operation is in progress. The Divemaster must pass on to emergency responders all known details of the accident, but may not insist that the victim be transported to a recompression chamber instead of to a hospital. [Note: Standard Coast Guard operating procedures do not normally allow for the administration of oxygen enroute unless specifically instructed by the patient. The Divemaster may be responsible for providing these instructions.] The choice of treatment location and regime is beyond the typical training of EPA field personnel. Emergency evacuation personnel should be instructed to communicate with the Divers Alert Network (DAN) at (919) 684-8111. Non-emergency diving related questions should be made to DAN at (919) 684-2948.

2. Communications.

The Divemaster will ensure that there is at least one means of emergency communication with shore support, such as, government radio, UHF radio, or cellular telephone. In the event of an emergency on site such as diver injury, sudden adverse weather, or chemical release which may impact outside of the immediate area, the divemaster or his alternate is responsible for immediately communicating the emergency to the nearest emergency response unit and the EPA unit from which the operation is based.

3. Oxygen Administration.

For any diving related injury (e.g., decompression sickness or air embolism), providing 100% oxygen is critical to successful treatment and recovery. It is required that all personnel be familiarized with the operation of the emergency oxygen equipment and it is recommended that all personnel complete training in oxygen administration for diving every two years such as available through the Diver's Alert Network (DAN) or other local sources.

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4. Transportation.

In the event of injury at a remote dive site, communication will be established with the closest emergency response unit, e.g. Coast Guard, or local authority via 911 telephone communication. The ranking dive team member will be responsible for determining the best course of action, as to stabilize the diver's condition and await transportation (e.g., for Coast Guard Evacuation) or to make best speed toward shore for treatment. For any diving related injury (e.g., decompression sickness or air embolism), providing 100% oxygen is critical to successful treatment and recovery.

G. Reciprocity.

In order to facilitate joint diving operations between EPA and colleges and universities, private institutions, grantees, states or counties, or any other agencies or entities, the Unit Diving Officer (UDO) may institute a reciprocity agreement that has been approved by the DSB Chairman, and which meets the following criteria:

[Need to revise per Duane Karna Comments...]

1. Visiting non-EPA certified divers accompanying EPA divers on EPA projects, or conducting dive projects for the EPA without the presence of EPA divers, shall have comparable diving training for the tasks to be performed....

(Karna Comment: The DSB needs to agree on what we will require of these divers. ... These requirements will likely be fashioned to the type of program the non-EPA diver comes from. In the case of NOAA they need only [a current letter of authorization signed by their UDO and a copy of the Diving Reciprocity Agreement]. In the case of a state agency, the local UDO may want ... . [Request that] anyone offers an opinion and suggest [appropriate] language here. What about requiring a checkout dive with the diver?)

2. Any reciprocity agreement shall apply only to divers in the employ of, or studying under, the sponsoring institution specified in the agreement; additional agreements will be required for divers not directly covered by the sponsoring institution. No third party agreements are allowed, per paragraph 6 below. The visiting diver must have written permission from his/her Diving Safety Officer (or UDO). In addition, the visiting diver must be covered by a comprehensive accident insurance plan by his/her sponsoring institution.
3. For a non-EPA diving program to be considered comparable to the EPA Diving Program, it must, at a minimum, conform to the OSHA Commercial Diving Standard (29 CFR 1910, Subpart T) or the terms of the Scientific Exemption for that Standard. The EPA Unit Diving Officer or his/her designee shall assure compliance with the terms of the reciprocity agreement; however, some records, such as medical records, may remain in the possession of the sponsoring institution. Compliance with the terms of this reciprocity agreement, as well as the actual diving operations, are subject

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to on-site inspection by members of the EPA Diving Safety Board at any time. UDO's may request written verification from the reciprocating organization as to the date of the last medical examination and that the individually named diver is cleared and rated for the given diving activities.

4. The reciprocity agreement may be renewed annually with the consent of all parties to the agreement, or it may be terminated or modified by the Chairperson or the DSB at any time.
5. An EPA diver may participate in a non-EPA project in an official capacity, provided he/she conforms to the provisions of the EPA Diving Program Operating Manual and the National Underwater Diving Safety Management Program, and the other divers in that diving operation meet the minimum EPA diving safety requirements for the degree of difficulty and complexity of for their role in the diving to be performed.
6. Reciprocity agreements from the EPA may not cover third parties to the co-signing organizations. Dive projects which involve three or more organizations may require that each organization which is interested in participating in an EPA sponsored project enter into a reciprocity agreement with the EPA.
7. Any EPA Regional Office or Laboratory which does not have an established Dive Unit, which may have need for occasional diving services, is required to conduct those operations in adherence to the policy and procedures set for under the EPA Underwater Diving Safety Management Program and this Diving Program Operating Manual. Such units are urged to seek the services of other EPA Units which have this capability. Contracted diving service organizations must show proof of operating under OSHA and Coast Guard regulations and have in place, its own "Diving Safety Program" even as the EPA may have site oversight. The on-scene coordinator should request assistance from an EPA diving UDO to review the contractor's operating procedures and safety plans to ensure compliance.

#### H. Exceptions

1. Deviations.  
Deviation from these regulations may be approved by the DSB Chairman, or his/her designee, when assured that such procedures are safe and essential to program operations. Emergency conditions may warrant actions contrary to the dictates of these regulations. A written report of such actions shall be submitted to the EPA DSB Chairman for review by the EPA Diving Safety Board.

[Note: It has been suggested that Item 2, below, be removed entirely to prohibit diving on EPA operations by those not specifically covered directly by EPA certification or under reciprocity agreements. The section has been retained pending action by the DSB.]

2. Diving by non-EPA certified divers observing EPA programs.

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EPA program sites are frequently visited by representatives of other agencies, the media, and dignitaries for the purposes of familiarization, evaluation, or reporting on EPA programs. Such visits often involve diving activities that are equivalent to recreational diving, and can be safely accomplished by persons holding recreational diving credentials. The requirements of EPA diver certification for working divers are substantially more stringent than the standards of the recreational diving industry. Therefore, it must be assured that observer divers do not pose a significant hazard to EPA divers through their lack of experience and/or training.

The policy and standards provided in TAB III, Dive Program Elements, Section F "Reciprocity" (p. III-6), of this Manual will allow EPA programs to safely accommodate observing divers who are not EPA certified, but meet the requirements stated herein. Personnel not certified by EPA, in accordance with the requirements of this Operating Manual, may dive in conjunction with the activities of EPA programs as "observing divers" without obtaining EPA Diving Certification. This policy applies to EPA employees and non-EPA personnel who have been invited to observe the underwater activities of EPA while using self-contained compressed air breathing equipment. This policy shall only apply when:

- a. the observing diver does not participate in work being performed and is accompanied by a fully certified EPA diver who is not performing work;
- b. the dive is considered light duty involving only observation or photography;
- c. the observing diver is participating in a single dive or a series of dives on a single trip not to exceed six (6) dives per year;
- d. persons who fall within the scope of this policy must provide to the EPA UDO prior to participating in a dive:
  - (1) evidence of diving certification by a recognized diver certifying organization such as US EPA, NOAA, the U.S. Armed Forces, or a recognized training agency;
  - (2) evidence of a physical examination conducted by a medical doctor in accordance with criteria developed by the Recreational Scuba Training Council (RSTC) within twelve (12) months of the date of the planned dive; (Report shall indicate medical fitness to dive.) and the observer is willing to complete a medical questionnaire and waiver of liability for the subject dive; and
  - (3) evidence of diving experience indicating the appropriate level of proficiency required for the diving conditions likely to be encountered.
- e. the EPA Unit Diving Officer:

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- (1) inspects the credentials of the observing diver (including an up to date logbook) and determines whether the observing diver has presented evidence establishing certification by an approved organization and has had a physical examination within twelve (12) months prior to the date of the planned dive;
- (2) determines if the observing diver's experience level and proficiency are adequate for the conditions likely to be encountered on the dive (Note: The UDO or Divemaster shall conduct an in-water evaluation of the observing diver, if necessary.) The observer should show proof of conducting at least one dive to the depth of the planned dive within the past three months or participate in a scuba review at the observer's expense.
- (3) inspects the observing diver's equipment for serviceability. (Items considered by the Divemaster to be unserviceable will be replaced with appropriate equipment provided by the observing diver.)
- (4) ensures that the observing diver is informed of the EPA Diving Safety Rules and that those rules are complied with during the dive; (The observer shall sign a statement indicating his/her understanding of the EPA Diving Safety Rules which shall be countersigned by the facility/installation director.)
- (6) maintains a file on each observer diver; (The file shall include but not be limited to a dive log, a copy of the certification, the physical examination, and a signed/countersigned statement of EPA Diving Safety Rules understanding.) and
- (7) retains the authority to suspend the diving operation based on his/her judgment regarding the ability of the observing diver, the adequacy of the diver's equipment, or the conditions at the dive site.



TAB IV

DIVER TRAINING AND CERTIFICATION

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TAB IV DIVER TRAINING AND CERTIFICATION

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## DIVER TRAINING AND CERTIFICATION

### A. Need for Divers.

Since EPA programs frequently require competent underwater operations, there is a demonstrated need for EPA employees who are capable of such operations. The roster of qualified divers and diving contractors cross referenced to areas of expertise will be maintained by the Training Director and the UDO's. Where the demonstrated needs exist, the DSB Chairman and Unit Diving Officers shall aid the various Regional, Office, and Laboratory (Unit) Directors in analyzing diving needs. Should circumstances dictate the need for additional divers to fulfill operational requirements, additional personnel may be selected and properly trained.

### B. Application for Training.

1. EPA personnel with or without previous training may apply through channels to the appropriate Unit Director to be considered for EPA diver training and certification when the need exists. Diver training may be provided by the EPA Diver Training Center in Gulf Breeze, FL or by the NOAA Diving Center in Seattle, WA.
2. As part of the application process to the EPA Training Center, each applicant for initial training, as well as those for certification based on past training, must complete the following preliminary actions that may apply:
  - a. Each applicant shall complete the physical examination as described in TAB IV Diver Training and Certification, Section C, "Physical Examinations" of this manual.
  - b. Provide evidence of cardio-pulmonary resuscitation (CPR) and First Aid training.
  - c. Provide evidence of basic SCUBA certification (requiring a minimum of four openwater certification dives) by a nationally recognized organization. All prospective EPA Divers must have successfully completed a basic diver training course offered by one of the nationally recognized agencies (e.g., NAUI, PADI, YMCA, NASDS, or approved colleges or universities) and provide the EPA Diver Training Director with a photocopy of the certification.
  - d. Submit a justified request from the UDO for diver training to the EPA Training Director. The individual's supervisor must submit a letter of request to the DSB Director of Training for EPA diver training and/or certification stating the need for the diver candidate to enter the program.
  - e. Successfully perform the swimming skills described in Section D, "EPA Diver Certification", Paragraph 2 Swimming Skills, below.

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- f. For initial training, complete and submit forms for Request, Authorization, Agreement and Certification of Training, to the EPA Diver Training Director.
  - g. For certification based on prior training and experience, submit verification of prior training and experience through the Unit Diving Officer to the EPA Training Director and DSB Chairman for approval and pass the standard EPA SCUBA written examination. An employee who applies for training and/or certification must volunteer the application of personal skills for EPA programs. The need for the employee's skill in EPA programs shall be considered by the appropriate official before taking action beyond this point.
  - h. Applicants for diver training at the NOAA Diving Center must fulfill the requirements in Section 5.15b Application for Training and Section 5.15c. Physical Examinations in the NOAA Diving Program administrative and Safety rules (March 29, 1991).
- C. Physical Examinations.
1. EPA employees must be medically qualified to perform their diving related duties. Medical qualification is obtained when the Diving Medicine Specialist (DMS) provides a signed qualification statement to the Unit Diving Officer (UDO) as provided in the Medical Evaluation Form in Appendix B. Only the Diving Medicine Specialist, or his designee, can provide this qualification statement.
  2. Full medical examinations are required:
    - a. prior to diver training and certification;
    - b. annually thereafter while continuing in an EPA diving status;
    - c. after a serious accident, injury or illness, at the discretion of the UDO;
    - d. upon the recommendation of the DMS and the approval of the Chair, DSB and SHEMD; and
    - e. upon termination of EPA diving related duties.
  3. UDOs will make the necessary arrangements to ensure that diver medical examinations occur in a timely manner. UDOs will provide divers / candidates with the official EPA Diving Medical Examination Form (grey-ed area for completion by candidate).
  4. UDOs will ensure that candidates and divers present to the closest EPA contracted medical provider for completion of the examination. The diver / candidate has the responsibility to complete the medical history portion of the evaluation form. Any

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questions or statements which are unclear to the candidate should be identified to the examining physician for clarification.

5. UDOs will ensure that the completed examination and all of the associated diagnostic studies are forwarded to the DMS for review and determination of diver qualification. The completed examination form, with attached diagnostic tests should be forwarded to: Occupational Medicine Specialist (Attn: Dr. Christopher S. Holland)  
Division of Federal Occupational Health  
4350 East-West Highway, Room 3-2A2  
Bethesda, MD 20814

Examinations conducted by Federal Occupational Health Units will automatically be forwarded to the above address. It will be the responsibility of the UDOs to ensure that examinations conducted by private providers / personal physicians are completed and forwarded to the indicated address.

6. Confidential medical evaluation forms should be sent in a double sealed envelope. The completed evaluation form and supporting information should be placed in an envelope labeled "Confidential Medical Information" and sealed. This envelope should be placed in a secondary envelope for mailing to the above address. This second envelope should also be labeled "Diving Examination" at the lower left corner.
7. UDOs will obtain qualification statements for each of their candidates and divers from the DMS. The DMS will also forward a copy of the qualification statement to the Chair, DSB. From the date of receipt at the office of the DMS, the turn-around for return of the qualification form to the UDO should not exceed one week. Should a quick response be required, a special request can be made, allowing for review and qualification to be made by electronic facsimile transmission on a same day basis.
8. When the examination absolutely cannot be conducted by the EPA medical contractor, the private provider should complete the EPA Diving Medical Examination form and forward it, as detailed above, to the DMS. The private provider is responsible for identifying any abnormal, historical, or physical findings and to describe those findings. As the private provider / personal physician may not necessarily be professionally qualified or experienced in diving medicine, the DMS alone will be responsible for determining diving duty medical qualification from the available data.
9. Applicants with "disqualifying medical conditions" recommendations will be forwarded indicating ineligibility for requisite diver training. Current EPA divers with such conditions will be recommended for removal from diving related duties.
10. Applicants or current divers with medical conditions which represent a relative disqualification may have recommendations for temporary suspension from diving related duties until a final determination can be made. The following options are available:

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- a. In some instances, divers may have their medical conditions accommodated in a manner that allows them to safely continue the majority of their diving related duties.
- b. In some instances, at the recommendation of the DMS and the approval of the Chair, DSB, a waiver board may be convened to consider the medical data and offer guidance to the Chair, DSB.

The formal recommendation of the DMS will be considered. The Chair, DSB, will make the final decision.

#### D. EPA Diver Certification.

EPA conducts periodic Diver Training Courses at the ORD laboratory in Gulf Breeze, Florida. A more detailed description of the course contents is set forth in the EPA publication entitled "Diver Training Curriculum", dated September 1996.

##### 1. Initial Training.

For those approved applicants with no previous training, initial diving training shall be taken through one of the following training programs:

- a. regularly scheduled and properly announced official EPA courses approved by the EPA Training Director with the advice and assistance of the EPA Diving Safety Board; or
- b. equivalent basic scuba diver training programs authorized by the EPA Training Director, or his designee, plus supplemental training through the Training Director to ensure that the student has satisfactorily completed all elements of the EPA SCUBA training curriculum.
- c. regularly scheduled NOAA Diver Training courses announced annually by NOAA.

##### 2. Swimming Skills.

Following approval of physical examination, each applicant shall demonstrate the following swimming exercises to the UDO, Training Director, or their designee, showing a noticeable degree of confidence and good swimming skills:

- a. swim two hundred and fifty (250) yards, using the crawl, sidestroke, and/or backstroke [alternatively the candidate may be required to swim a distance of one-quarter mile (440 yds) on the surface in full scuba gear];
- b. swim a horizontal distance of fifty (50) feet at a constant shallow depth underwater without surfacing [alternatively this may be conducted in full scuba gear with the air supply closed];

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- c. stay afloat for fifteen (15) minutes;
  - d. transport another person 25 yards on the surface of the water without the use of swim aids and/or transport another diver in full scuba gear 50 yds;
  - e. surface dive to a depth of 10 feet using mask, snorkel and fins to recover a 4 pound weight and clear the snorkel upon returning to the surface; and
  - f. conduct the following exercise: enter the water in full scuba gear by giant stride, demonstrate mask clearing, buddy breathing [or other alternate air source use with a buddy], underwater (u/w) hand signals, equipment removal/replacement, exit the water using a boat ladder and stow equipment.
3. Written EPA SCUBA Examination.  
All applicants for EPA certification shall pass a standard EPA written examination. Passing score for each part shall be seventy (70) percent. Applicants failing any part must take a re-examination of the failed part and have a subsequent score of ninety (90) percent on sections A and B and ninety (90) percent on section C. The candidate is responsible for reviewing any incorrect answers, acknowledge and correct the errors to confirm a thorough understanding of the material (e.g., achieving a 100% understanding). The Training Director is responsible for preparation, administration and scoring of the examination.
4. Diving Evaluation.  
The prospective divers must demonstrate their proficiency and skill in diving by making a checkout dive with the appropriate training course supervisor or designee.
5. Certification.  
Upon completion of basic scuba training requirements, satisfactory written and medical examinations, and EPA field diver evaluations appropriate to the situation, the EPA Training Director shall make a final review of all certification requests. EPA employees shall then be considered for certification in one of the following categories.
  - a. Trainee Diver. An EPA employee with initial diver training through a recognized training agency and has logged less than twenty-five (25) dives. Trainees may not perform working dives, but may accompany two (2) Working Divers as an observer. In cases where two working divers may not be required (e.g., in simple site observations and photography), the Trainee Diver may accompany a single Working Diver.
  - b. Working Diver. An EPA diver who has:
    - (1) completed a minimum of twenty-five (25) logged dives, and
    - (2) demonstrated proficiency to carry out assigned tasks as may be required during the EPA's Annual Diver Training Program such as:
      - (a) variable volume dry suit use;

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- (b) full-face mask use
  - (c) underwater (u/w) voice communication system use
  - (d) u/w object recovery by use of a lift bag;
  - (e) u/w pipe frame object assembly/disassembly; and
  - (f) u/w pipe flange assembly/disassembly;
  - (g) u/w pinger locator use; and
  - (h) maintain buddy awareness and monitor for signs of decompression illness.
- (3) by passing the EPA's written examination, demonstrate a proficiency in such areas as:
- (a) dive physics;
  - (b) dive physiology;
  - (c) decompression table use;
  - (d) decompression illness signs/symptoms;
  - (e) oxygen administration;
  - (f) dive accident management;
  - (g) dive equipment; and
  - (h) Nitrox (oxygen enriched air).

c. Divemaster. An EPA Working Diver who has:

- (1) successfully completed the requirements for an EPA working diver (above);
- (2) demonstrate proficiency in conducting the duties of divemaster as may be conducted during the EPA's Annual Diver Training Program, such as:
  - (a) supervising divers in conducting assigned tasks;
  - (b) if available for use, supervising divers by underwater voice communication;
  - (c) maintaining diver time and activity logs;
  - (d) monitoring divers breathing gas supply;
  - (e) monitoring divers for signs of decompression illness; and
  - (f) conducting a simulated unconscious diver rescue and recovery.
- (3) completed a minimum of one hundred (100) logged official work and training dives;
- (4) successfully completed a diving supervision course (e.g., Divemaster training course);
- (5) completed two (2) or more dives with the Unit Diving Officer or his designee; and
- (6) obtained experience in a variety of diving conditions.



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E. Issuance.

1. An EPA Diver Certification shall be issued by the EPA Training Director based upon the recommendations of the training team (e.g., Training Director, UDOs, Instructors and Divemasters), following final review of each applicant's submitted documents. The EPA Training Director shall issue a Letter of Certification (see Appendix 4 to this Chapter) to the diver and to the diving program file established for the diver. (This file is subject to the requirements of the Privacy Act of 1974.)
2. EPA recognizes and accepts diver certifications issued by the Director, NOAA Diving Program, for candidates who successfully complete the NOAA diver certification process.

F. Prior Equivalent Diver Training.

UDOs may evaluate the credentials of a dive candidate with prior non-EPA dive training and experience for application into the EPA Diving Program. After the candidate successfully passes the medical examination for diving and the written EPA SCUBA examination, the UDO will determine if the applicant sufficiently meets EPA's criteria as a trainee or working diver. If the candidate does not meet either of these criteria, he/she will be required to take refresher training as directed by the EPA Training Director. If the candidate meets the trainee or working diver criteria, the UDO will:

1. observe the candidate in demonstrating the required swimming skills (Part IV.D.2).
2. observe the dive candidate in a checkout dive; and
3. forward to the EPA Training Director all appropriate documents along with a recommendation for the level of EPA certification to be granted.

G. Terms of Qualification/Proficiency.

EPA certified divers should log an average of at least two (2) diving days per month. Anytime six (6) weeks or more elapse without a dive, the diver should complete a requalifying program. Anytime three (3) months or more elapse without a dive or thirteen (13) months from the date of the last physical examination, the diver must complete a requalifying program before resuming work dives. The DSB Chairman, with the advice of the Unit Diving Officer or their designee, shall specify the requalifying program. This requirement may be waived by the official in charge of the project, program, or command only during emergency conditions. A report of such waiver must be submitted to the DSB Chairman through the Unit Diving Officer for review by the EPA Diving Safety Board. Supervisors shall authorize the necessary time and payment for qualifying dives if diving is required for official program activities. Diving equipment shall be made available during non-duty hours for purposes of maintaining diver proficiency.

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#### H. Requalification.

The EPA Training Director, or designee, may requalify a diver whose qualification has lapsed after the diver has again completed the requirements for proficiency.

#### I. Suspension of Qualification.

An EPA Diver qualification may be suspended for cause by the Unit Diving Officer or EPA DSB Chairman. Violation of any regulation in this Chapter or lack of good judgment may be considered cause. The diver shall be informed in writing of the reasons for suspension and will be given the opportunity to appeal the suspension to the EPA Diving Safety Board.

#### J. Refresher Training.

EPA certified divers will have periodic refresher training in CPR, oxygen administration, first aid, diving accident management, and other diver training as determined necessary by the UDO, Training Director, or the DSB.

[Future]

TAB V

Underwater/Diving Operations  
Safety Information Management System  
(UDOSIMS)

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[Future]

## UNDERWATER DIVING OPERATIONS SAFETY INFORMATION MANAGEMENT SYSTEM (UDOSIMS)

A centralized computer-based underwater/diving operations safety information management system (UDOSIMS), accessible by all regions and selected laboratories, supports the Program at Headquarters and at local operating units. UDOSIMS functions to collect, store, analyze develop and disseminate information relevant to the National Underwater/Diving Safety Management Program for the benefit of EPA workers and divers.

UDOSIMS helps meet the goal of minimizing EPA worker exposure to hyperbaric illnesses by enabling analysis of occupational hyperbaric information, by assisting in identifying worker practices which carry increased risk, and by monitoring conformity with Program evaluation objectives, among other activities. The system is capable of generating some of the reports required for complying with directives of other regulatory agencies [e.g., Occupational Safety and Health Agency (OSHA) and U.S. Coast Guard] In addition, UDOSIMS can be used to produce reports that fulfill special or urgent needs. The UDOSIMS serves not only as a repository for information, but also as a decision-support resource for overall Program management. The system functions as a platform for QA/QC data collection, data analysis, and report production for Underwater/Diving Operations Safety Program activities on an Agency-wide scale.

Major data sets comprising the Underwater/Diving Operations Safety Information Management System include, but are not limited to:

- diving records for personnel;
- a roster of qualified divers and diving contractors cross referenced to areas of expertise;.
- staff dive training and safety records;
- dive incident reports; and
- records of QA/QC data.

Other data sets may be added to the system later (e.g., regulatory compliance records and critical issue tracking).

Types of reports to be generated by the system include, but are not limited to:

- individual diver dive log reports

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- training reports;
- dive incident reports;
- QA/QC reports; and
- reports to fulfill national and local needs.

The system architecture consists of personal computers linked via standard telephone communications networks to the central UDOSIMS computer managed by Headquarters. The following UDOSIMS features are enabled under this architecture:

- headquarters access to all diving safety information entered from operating units, data analysis capabilities, and Program QA activities;
- operating unit access restricted to those data regarding local employees only; data entry and retrieval for selected data fields limited to the local-level;
- operating system offers dependable data security features;
- the application program offers user-friendly interface for entering and maintaining all data elements, combined with the capability for generating standard, as well as any customized, forms and reports; and
- integration with other databases and information management systems.

User manuals and training for EPA Headquarters and operating unit personnel who are end-users of the Underwater/Diving Operations Safety Information System is provided. Such training includes instruction regarding set-up of local communications equipment, data entry and retrieval for permissible fields/files, the preparation of various reports (e.g. quarterly dive activity reports to personnel), and operation of all system utilities available to the end-user.

TAB VI

ABBREVIATIONS AND ACRONYMS

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## ABBREVIATIONS AND ACRONYMS

AAUS	--	American Academy of Underwater Sciences
CFR	--	Code of Federal Regulations
DAN	--	Divers Alert Network
DSB	--	Diving Safety Board
EPA	--	Environmental Protection Agency
MOU	--	memorandum of understanding
NAUI	--	National Association of Underwater Instructors
NOAA	--	National Oceanic and Atmospheric Administration
OSHA	--	Occupational Safety and Health Administration (Dept. of Labor)
PADI	--	Professional Association of Diving Instructors
ROV	--	remotely operated vehicles
RSTC	--	Recreational Scuba Training Council
SCUBA	--	self contained underwater breathing apparatus
SHEMD	--	Safety, Health and Environmental Management Division
SHEMP	--	Safety, Health and Environmental Management Program
UDO	--	Unit Diving Officer
UDOSIMS	--	Underwater Diving Operations Safety Information Management System
U/W	--	underwater
VVDS	--	variable volume dry suit
YMCA	--	Young Men's Christian Association, SCUBA Training Certification Program

TAB VII  
APPENDICES



## Appendix A

### EPA DIVING SAFETY RULES

## Appendix A

### EPA DIVING SAFETY RULES

1. Certification. Each diver must have a valid EPA certification or EPA-approved equivalent.
2. Solo Diving. No one may dive unattended.
3. Depth Limits. Normally, dives shall not exceed 130 feet. Proposals for planned dives to depths greater than 130 feet will require written approval by the EPA DSB Chairman or designee. Dives to be conducted to depths greater than 130 ft. require that a working recompression attended by trained personnel be ready at the dive site.

Dives to conducted in excess of 100 ft. require that divers have commensurate training and or experience working at the proposed depth. If no prior experience exists, the diver is to complete a checkout dive to the planned water depth or greater within six weeks of the scheduled working dive. Depending upon conditions and at the recommendation of the divemaster or UDO, an alternate or redundant air source may be required.
4. Decompression Tables. All dives using compressed air (i.e., other than NOAA Nitrox I or II) will be conducted using the U.S. Navy Standard Air Decompression Tables. Decompression tables should be copied for use by some photographic method that reproduces an exact copy.
5. Diving Logs. All EPA divers are required to maintain an EPA personal dive log. The information logged must include the dive location, purpose or function, maximum water depth, and bottom time. In addition, the dive tender shall also record (on the Dive Tender's Log) any other information that is needed by the Divemaster of the UDO. The dive tender must also record the diver's surface interval time for repetitive dives. The diver must log his bottom (subsurface) time and surface interval time in the case of repetitive dives. A dive is completed when a diver leaves the water after completing an activity or, after surfacing for more than ten minutes, before resubmerging to perform a different activity.

a. Bottom Time is the total elapsed time in whole minutes from when a diver leaves the surface to begin his descent until the time he begins his direct ascent to the surface. A "dive" is that time and activity spent beneath the surface of the water by a person equipped with diving gear. However, when it is practical to do so, bottom time shall be defined as the time from when the diver leaves the surface until the diver returns to the surface (i.e., including the time spent surfacing). This is the more conservative approach, and it has the advantage that both submerging and surfacing are events easily recorded by the Tender on the surface.

b. Surface Interval is the time which the divers have spent on the surface following a dive, beginning as soon as the divers surface and ending as soon as they begin their next descent. For surface intervals less than ten (10) minutes, add the bottom time of the previous dive to that of the repetitive dive and choose the decompression schedule for the bottom time and the deepest water depth achieved for the sequence.

6. Decompression Dives. Routine working dives shall not exceed the U.S. Navy no-decompression limits. Diving activities that exceed the limits of no decompression will be permitted only under the following conditions.

a. Proposal. A detailed dive plan has been reviewed by the UDO or the DSB Chairperson

b. Competence. The project leader must demonstrate to the Unit Diving Officer, or his designee, that the Divemaster and all members of the diving team have a thorough knowledge of decompression and repetitive dive principles.

c. Dive Team. The team must be composed of no fewer than four people: two divers in the water, a standby diver, and a dive tender.

d. Equipment. Each participating diver must wear a watch or bottom timer, depth gauge, and have on hand a decompression schedule for the maximum proposed depth of dive.

7. High Altitude Diving. Decompression tables, depth of stops, rate of ascent, and repetitive dive planning must be altered for safe diving at altitudes above 1,000 feet. The current edition of the NOAA Diving Manual should be used as a guide for diving at high altitudes.

8. Flying After Diving. Wait a minimum surface interval of 12 hours prior to flying after diving. When making daily, multiple dives for several days or making a dive requiring an emergency decompression stop, extend the surface interval beyond twelve hours. Whenever possible wait 24 hours before flying.

9. Over-Bottom Dives. Dives in waters where a diver could sense a loss of orientation or descend below safe diving depths are to be considered over-bottom dives. No over-bottom dives shall be made unless some direct contact with the surface is maintained, such as net web, a marked line suspended from a surface float, or depth gauges for all participants, which permits the diver to determine when ascent or descent occurs. Additional procedures can be found in the current edition of the NOAA Diving Manual.

10. Boat Tending. During dives beyond swimming distance from shore or those in areas of strong currents, a small boat with a qualified operator will tend the divers (see item 16.j, regarding use of "diver down" flag).

11. Ship Activities. When appropriate during ship-related diving activities, the SM "Dive Safe Ship Operations Checklist" (e.g., NOAA Form 64-3) will be completed and used.

12. Recompression Chamber. The location, accessibility, and telephone number of all accessible and operable recompression chambers shall be listed in the dive plan and be available to all participating divers each diving operation.

13. Emergency Procedures. The Unit Diving Officers, or their designee, with the approval of the EPA Diving Safety Board will prescribe emergency procedures to be used in handling diving-related accidents in the operational area, and all divers shall be familiar with these procedures.

14. Diving Accident Management Training. All divers shall have diving accident management training, and certification for cardiopulmonary resuscitation (CPR), and first-aid training, and shall complete appropriate refresher training to maintain skills.

15. Emergency Oxygen Resuscitators. An oxygen resuscitator of at least 650 liters (e.g., single Jumbo D or E cylinders or multiple smaller cylinders) capable of ventilating a non-breathing person, shall be immediately available at each dive site, local laws regarding resuscitating equipment permitting. Divers and diver support personnel shall be trained in the use of this equipment. Two such units are highly recommended since both divers of a buddy pair will likely have the same exposure and thus may exhibit the same symptoms.

16. Equipment.

a. Life Support. Open-circuit SCUBA using compressed air or oxygen enriched air shall be standard. Other types of equipment (i.e., surface-supplied diving equipment, closed-circuit rebreathers, semiclosed units or other types of diving apparatus using gas mixtures) may be approved for use by the EPA Diving Safety Board DSB Chairperson, Technical Director, or Training Director. Individuals requesting use of these other types of equipment must have been trained and qualified in their use.

b. Alternate Air Source To allow for the eventuality of a termination of a team member's air supply, each free swimming scuba diver will have available on his system an alternate air source. The alternate air source may be a spare second stage regulator (i.e., an "octopus") or a redundant air system (e.g., "pony" bottle or dual manifold system). [Board members recommend

addressing alternate air sources regarding full face masks. Also. decon ops air supply with full face masks.]

c. Harness and Weight Belt. All harnesses and weight belts must have a quick release.

d. Flotation Device. Each free swimming SCUBA diver shall wear an adequate flotation device, such as a buoyancy compensator, that has a means of inflation other than oral. (See note regarding variable volume dry suits)

e. Variable Volume Dry Suits. Variable volume dry suits (VVDS) will be used only after satisfactory completion of a minimum of three (3) hours of training in the use of these suits [two (2) hours of which must have been in open water] from qualified persons designated by the EPA DSB Training Director, or equivalent prior experience verified by a qualified EPA Unit Diving Officer or designee.

Caution: Compensating devices that might obstruct inflation or exhaust valves should not be worn over VVDS.

As variable volume suits do not qualify for flotation is use of scuba, another appropriate buoyancy compensating device (BCD) should be used which will not obstruct the valve systems. A BCD is not required or recommended for use in any surface supplied system. In contaminated water environments, the BCD should be capable of being decontaminated or be considered expendable.

[Note: VVDS (particularly shell type) manufacturers do not warranty their suits for floatation. Therefore, the user assumes full risk if no additional buoyancy control device (BCD) is used. As such the user should use a BCD which meets the following requirements: 1.) it does not obstruct the operation of the valves on the VVDS; 2.) if the BCD is to be used in chemically, biologically or radiologically contaminated environments, then the BCD must be capable of being decontaminated (interior as well as exterior) by a method appropriate to the contamination present without degradation of the device or operation of the device. If no BCD is available to meet the criteria, the VVDS must be thoroughly inspected for abnormal wear or seam stress which may indicate a potential failure before/after each use. By the same token: dry suits should be "qualified" for contaminated environment use by manufacturer warranty or suit materials (especially seams, seals and closures/zippers) should be compatibility tested.]

f. Compass. An underwater compass shall be carried by each free swimming diver on all dives.

g. Depth Gauge. A depth gauge shall be carried by each diver on all dives.

h. Decompression Meters. Use of decompression meters will be authorized only by the EPA DSB Chairman, the DSB Technical Director or the UDO.

i. Diving Timer. A diving watch or other suitable timing device shall be worn by each member of a SCUBA diving team. In all cases, an accurate time record of any dive must be kept.

j. Diving Flag. An appropriate diving flag shall be shown at all times while actively diving.

k. Air Compressor. No person shall operate a SCUBA air compressor without having first read the instructions and assisted an operator experienced in its operation. An operational log shall be maintained for all EPA SCUBA compressors. compressed air, from all active compressors, shall be tested every six (6) months by an approved method.  
(Reference: NOAA Diving Manual)

- (\*) l. Submersible Pressure Gauge. Each diver shall have a submersible gauge capable of directly reading the breathing gas pressure in his gas supply as an integral part of his scuba regulator system.
- (\*) m. Line Cutter/Dive Knife. Each diver shall carry at least one line cutter (e.g., dive knife, scissors, or other cutting tool) for use in release of line entrapment.
- (\*) n. Emergency Signaling Device. Each diver shall carry or have as integral part of his dive equipment an emergency signaling device (e.g., whistle, compressed air horn/whistle, mirror, light, or inflatable signal tube).

17. Equipment Maintenance. All diving gear and accessory equipment shall be maintained in a safe operating condition. Manufacturers' recommended servicing policy shall be followed. Equipment in questionable condition shall be tested, repaired, overhauled, or discarded. Such equipment shall be kept separate from operational equipment and clearly identified. All regulators, regulatory valves, depth gauges, submersible pressure gauges, and decompression meters must be critically examined, checked for accuracy, and calibrated by a competent mechanic or appropriate specialist every twelve (12) months. A record of the inspection and repair will be filed with the Unit Diving Officer.

18. Scuba Cylinder Inspection and Testing. All SCUBA cylinders must be visually inspected annually by a qualified SCUBA tank inspector, who will attach a dated visual inspection sticker to the cylinder. Cylinders will be hydrostatically tested at least every five (5) years. The dates of the last hydrostatic test must be stamped on the cylinder.

19. Air. Scuba cylinders shall be charged only with air or an oxygen enriched air mixture certified as meeting established air standards.

20. Minimum Air Supply. Divers must surface with a minimum of 500 psig in the tank as a safety factor for reaching the shore or boat and to prevent inclusion of water in the cylinder.

## Appendix B

### EPA Diving Medical Examination Form



Appendix B EPA DIVING MEDICAL EXAMINATION

Diver is to complete all shaded medical history column prior to appointment. Any questions or statements which are unclear to the diver / candidate should be identified to the examining physician for clarification.

Completed by Health Center  
Address/Location of Testing:

Phone #:  
Providers' Name: (print)  
RN:  
MD/DO:

REQUIRED DIAGNOSTIC SERVICES

- ☐ - EKG: Baseline, annual  
☐ - AUDIOGRAM: Baseline, annual  
☐ - CHEST X-RAY: Baseline, annual  
☐ - VITAL SIGNS: Baseline and annual  
☐ - HEIGHT AND WEIGHT: Baseline and annual  
☐ - PULMONARY FUNCTION TESTING: Baseline, annual  
☐ - ROUTINE LABORATORY: Baseline, annual  
☐ - BLOOD TYPE AND RH: Baseline  
☐ - SICKLE CELL TEST: Baseline  
☐ - ATTACH HARD COPY OF ALL DIAGNOSTIC TEST RESULTS

DEMOGRAPHIC DATA

Name (Print/type)

ID#

Date of Testing

Date of Birth

Sex

Functional Requirement

VISION

Near  
Ability to read:  
gauges, compass, watch, tables if lose  
corrective lenses  
  
Far  
Ability to locate buddy or dive boat if  
lose corrective lenses  
Normal depth perception

SINUSES/MASTOID

Unobstructed drainage

ORAL CAVITY/THROAT

Normal breathing.  
Able to equalize under pressure.  
Able to use a mouth regulator.  
Unobstructive drainage.  
Good oral hygiene, no badly decayed or  
broken teeth.

Medical History

Have you had or are you currently experiencing any of the following conditions:

- Frequent headaches  
Blurred vision  
Difficulty reading  
Have you ever been diagnosed  
with any eye disease?  
Do you wear glasses?  
Do you wear contact lenses?  
Have you had a radial  
Keratotomy?  
Do you have cataracts?  
Are you color blind?  
  
History of mastoid infection  
or surgery?  
Any surgery on sinuses?  
Any history of chronic pain?  
Acute or chronic infections?  
  
Use of dentures/dragawork?  
Facial disformities?  
(EX: cleft palate, bifid uvula)  
History of allergic vasomotor rhinitis?  
History of nasal polyps/deviated  
nasal septum?  
Disorders of the larynx?

Diagnostic and Physical Findings

EXAMINER: Please comment on all positive historical entries.  
Comment on all physical abnormalities.

Color Vision

- Normal ☐  
Abnormal ☐  
Type of test  
Ishihara plate ☐  
Yarn test ☐  
Other

Head and Neck

- Normal ☐  
Abnormal ☐  
Head/Face/Neck (thyroid), Scalp  
Nose/Sinuses  
Mouth/Throat  
Pupils equal/reactive  
Ocular Motility  
Ophthalmoscopic Findings

Uncorrected vision

Both Nr 20/ ☐ Right Nr 20/ ☐ Left Nr 20/ ☐  
Both Fr 20/ ☐ Right Fr 20/ ☐ Left Fr 20/ ☐

Corrected vision

Both Nr 20/ ☐ Right Nr 20/ ☐ Left Nr 20/ ☐  
Both Fr 20/ ☐ Right Fr 20/ ☐ Left Fr 20/ ☐

EXAMINER: Please comment on all positive historical entries.  
Comment on all physical abnormalities.

Client Name

DATE

JANUARY 1995

Appendix B - 1

Functional Requirement	Medical History	Diagnostic and Physical Findings																								
<b>EARS</b>  Normal hearing without use of hearing aid. No disorder that would trap gas in the middle ear or external canal. Normal sense of balance and equilibrium. Must be able to demonstrate "clearing ears" by auto-inflating middle ear space.	Have you experienced any of the following:  Difficulty hearing? Yes <input type="checkbox"/> No <input type="checkbox"/>  Ringing in the ears? Yes <input type="checkbox"/> No <input type="checkbox"/>  Acute ear infections? Yes <input type="checkbox"/> No <input type="checkbox"/>  Chronic ear infections? Yes <input type="checkbox"/> No <input type="checkbox"/>  Dizziness or balance problems? Yes <input type="checkbox"/> No <input type="checkbox"/>  Ear drum perforations? Yes <input type="checkbox"/> No <input type="checkbox"/>  Past or recent history of E-T tubes? Yes <input type="checkbox"/> No <input type="checkbox"/>  Cerumen (wax) impaction? Yes <input type="checkbox"/> No <input type="checkbox"/>  Congenital problems (stenosis or atresia) with ear canal? Yes <input type="checkbox"/> No <input type="checkbox"/>  History of swimmer's ears? Yes <input type="checkbox"/> No <input type="checkbox"/>  History of ear surgery? Yes <input type="checkbox"/> No <input type="checkbox"/>  Meniere's Disease? Yes <input type="checkbox"/> No <input type="checkbox"/>  Cholesteatoma? Yes <input type="checkbox"/> No <input type="checkbox"/>	<div> <div> <div>Ears</div> <div> <div>Left</div> <div> <div>Normal</div> <div><input type="checkbox"/></div> <div>Abnormal</div> <div><input type="checkbox"/></div> </div> </div> <div> <div>Right</div> <div> <div>Normal</div> <div><input type="checkbox"/></div> <div>Abnormal</div> <div><input type="checkbox"/></div> </div> </div> </div> <div> <div> <div>External ear</div> <div><input type="checkbox"/></div> </div> <div> <div>Canal</div> <div><input type="checkbox"/></div> </div> <div> <div>Tympanic Membrane</div> <div><input type="checkbox"/></div> </div> </div> <div> <div> <div>Tympanic Membrane Visualized</div> <div>YES <input type="checkbox"/> NO <input type="checkbox"/></div> </div> <div> <div>Tympanic Membrane Visualized</div> <div>YES <input type="checkbox"/> NO <input type="checkbox"/></div> </div> </div> <div> <div>Auto-inflation of middle ear:</div> <div>Passed <input type="checkbox"/> Failed <input type="checkbox"/></div> </div> <div>           EXAMINER: Please comment on all positive historical entries.            Comment on all physical abnormalities.         </div> </div>																								
		<div> <div> <div>Audiogram:</div> <div> <div>Baseline</div> <div><input type="checkbox"/></div> <div>Annual</div> <div><input type="checkbox"/></div> <div>Follow-up</div> <div><input type="checkbox"/></div> <div>Termination</div> <div><input type="checkbox"/></div> </div> </div> <div> <div> <div>(Attach current and baseline audiogram)</div> </div> </div> </div> <div> <div>Calibration Method:</div> <div>Oscar <input type="checkbox"/> Biological <input type="checkbox"/> Date _____</div> </div> <table border="1"> <thead> <tr> <th>Frequency</th> <th>500Hz</th> <th>1000Hz</th> <th>2000Hz</th> <th>3000Hz</th> <th>4000Hz</th> <th>6000Hz</th> <th>8000Hz</th> </tr> </thead> <tbody> <tr> <td>Right ear</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Left ear</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <div>           Review/compare with baseline: Change <input type="checkbox"/> No change <input type="checkbox"/>  <input type="checkbox"/> Normal <input type="checkbox"/> Abnormal            Explain:         </div>	Frequency	500Hz	1000Hz	2000Hz	3000Hz	4000Hz	6000Hz	8000Hz	Right ear								Left ear							
Frequency	500Hz	1000Hz	2000Hz	3000Hz	4000Hz	6000Hz	8000Hz																			
Right ear																										
Left ear																										

Functional Reql	nt	Medical History	Diagnostic and Physical Findings
<b>LUNGS</b> Absence of medical conditions that increase risk of air trapping. Full use of both lungs.	Have you experienced any of the following:  Chronic obstructive lung disease Asthma (incl exercise induced asthma) Bronchitis Emphysema Acute or chronic lung infections Surgery: thoracotomy, laryngocoele, tracheostomy Pneumothorax Scoliosis with respiratory limitations History of tuberculosis  Angina, dysrhythmia History of Myocardial Infarction Organic heart disease Inc: prosthetic heart valves, mitral stenosis, supraventricular tachycardia, heart block, pacemakers, Wolf Parkinson White (WPW) Syndrome Coronary bypass graft Mitral Valve Prolapse Palpitations Chest pain Syncope (sudden unconsciousness)  Evidence of large varicose veins Poor venous return Deep vein incompetence  Evidence of atherosclerosis, arteriosclerosis History of Hypertension Cerebro-vascular accident (CVA) Transient ischaemic Attack (TIA) Aneurysms Peripheral vascular disease Raynaud's phenomenon	<b>Cardio/Pulmonary</b> Normal <input type="checkbox"/> Abnormal <input type="checkbox"/> <input type="checkbox"/> EKG - Attach <input type="checkbox"/> Lungs/Chest (includes breast) <input type="checkbox"/> Heart (thull, murmur, heave) <input type="checkbox"/> Vascular (Varicosities)  Pulmonary Function Testing: (Attach Copy)  Calibration Date _____ Machine Brand _____  %Predicted FVC %Predicted FEV <sub>1</sub> %Predicted FEV <sub>1</sub> /FVC %Predicted PEF 25-75	<b>CHEST X-RAY</b> Last PA Chest X-ray: _____ Date: _____ Result: <input type="checkbox"/> Normal <input type="checkbox"/> Abnormal Comments: _____  <b>VITAL SIGNS</b> Height _____ Weight _____ mmHg Blood Pressure _____ Pulse _____ /MIN Respirations _____ /MIN Temp (if indicated) _____ <input type="checkbox"/> Normal <input type="checkbox"/> Abnormal  <b>CORONARY RISK FACTORS</b> Yes <input type="checkbox"/> No <input type="checkbox"/> Blood pressure $\geq 145/90$ <input type="checkbox"/> Fasting Glucose $\geq 120$ mg/dl <input type="checkbox"/> Total cholesterol $\geq 200$ mg/dl <input type="checkbox"/> Family history of CVD in members $\leq 55$ <input type="checkbox"/> Obesity <input type="checkbox"/> No regular exercise program <input type="checkbox"/> Currently smoking or $\geq 10$ pack/year history <input type="checkbox"/>
<b>HEART</b> Able to exercise at peak capacity without significant risk.			
<b>VASCULAR</b> Normal blood pressure No disorders leading to sudden loss of balance or unconsciousness.		<b>Cardiac Risk Profile</b> Chol _____ HDL _____ LDL _____ Trig _____ Gluc _____  This information is needed since smoking increases your risk for lung cancer and several other types of cancer: chronic bronchitis, emphysema, asbestos related lung diseases, coronary heart disease, high blood pressure, and stroke. Please check your smoking status and complete this section:  <input type="checkbox"/> <b>Current Smoker</b> Number of cigarettes per day _____ Number of cigars per day _____ Number of pipe bowls per day _____ Total years you have smoked _____  <input type="checkbox"/> <b>Former Smoker</b> Number of cigarettes per day _____ Number of cigars per day _____ Total years you smoked _____ Years since quitting _____  <input type="checkbox"/> <b>Never Smoked</b>	
		Physical Activity or Exercise Program (Check one) Intensity: Low _____ Moderate _____ High _____ Activity _____ Frequency _____ Days per week _____ Duration _____ Minutes _____	

Functional Requirement	Medical History	Diagnostic and Physical Findings
<b>MUSCULO-SKELETAL</b> Must have excellent balance, muscular coordination. Free of recurring muscle or bone pain. Must have use of both arms and legs. Capable of strenuous physical activity. Capable of swimming unhindered	Have you had or do you currently experience any of the following conditions: Moderate to severe arthritis Amputations Paraplegia Aseptic bone necrosis. Chronic pain syndromes. Back pain with neurological deficit or leg pain. Any neurological disease Epilepsy Convulsions (not childhood febrile). History of spinal chord trauma. Organic disease of the central nervous system. Peripheral neuropathy. Intra-cranial surgery. History of head injury with sequelae. Chronic recurring headaches Brain tumor. Esophageal diverticula. Severe reflux Hiatal hernia. Gas blost syndrome Gastroic outlet obstruction Ileostomy obstruction. Diverticulitis. Hernias. Fistulas. Colostomy. Hepatitis. Active ulcer disease. Intable bowel syndrome. Rectal bleeding. Vomiting blood. Diabetes (insulin requiring) Diabetes (Non-insulin requiring) Juvenile onset diabetes Thyroid Disease Obesity Sun sensitivity Allergic dermatitis to rubber History of chronic dermatitis Active skin disease	<b>Musculoskeletal</b> Normal <input type="checkbox"/> Abnormal <input type="checkbox"/> Upper extremities (strength) <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Upper extremities (range of motion) <input type="checkbox"/> Aerobic exercise program minimum 3 hr/wk Lower extremities (strength) <input type="checkbox"/> Push ups Lower extremities (range of motion) <input type="checkbox"/> Pull ups Feet <input type="checkbox"/> Sit ups Spine, other musculoskeletal <input type="checkbox"/> Sit and reach (Flexibility) Sit and reach test <input type="checkbox"/> One and one half mile (timed run) (Sitting on floor with legs straight - can touch toes.) <input type="checkbox"/> Swim a distance of 1/4 mile (surface in full diving gear) <input type="checkbox"/> Swim a horizontal distance of 50 feet under water, in full SCUBA gear with the air turned off <input type="checkbox"/> Stay afloat for 30 minutes <input type="checkbox"/> Transport another person 75 feet in the water without the use of swim aids <input type="checkbox"/> Surface dive to 10 feet
<b>NEUROLOGY</b> Must be capable of normal sensation and motor skills. Clear mentation, normal orientation and balance. Absence of recurring pain.		<b>NEUROLOGY</b> Normal <input type="checkbox"/> Abnormal <input type="checkbox"/> Cranial nerves <input type="checkbox"/> Cerebellum <input type="checkbox"/> Motor/sensory <input type="checkbox"/> Deep tendon reflexes <input type="checkbox"/> Mental status examination <input type="checkbox"/> <b>ABDOMINAL</b> Normal <input type="checkbox"/> Abnormal <input type="checkbox"/> Auscultation <input type="checkbox"/> Palpation <input type="checkbox"/> Organo-megaly <input type="checkbox"/> Tenderness <input type="checkbox"/> Inguinal hernias <input type="checkbox"/> Urogenital exam <input type="checkbox"/>
<b>ENDOCRINE</b> Free of endocrine disorders that will lead to sudden unconsciousness No endocrine disorders that increase risk of severe vascular disease (incl: diabetes, obesity)		<b>EXAMINER:</b> Please comment on all positive historical entries. Comment on all physical abnormalities.
<b>DERMATOLOGY</b> Must be free of skin disease that will cause chronic fascial dermatitis. Free of skin disease that will serve as a source of chronic infection. Free of skin disorder that would be confused with Type 1. Decompression illness. Free of acute or chronic dermatitis that would be worsened by prolonged immersion.		

Functional Requirement	Medical History	Diagnostic and Physical Findings
<b>PHYSICIAN</b> Must be emotionally stable, mature. Exhibit good judgement Capable of responsible, reliable service.	Have you had or are you currently experiencing any of the following conditions? Yes No History of psychosis? <input type="checkbox"/> <input type="checkbox"/> Poor adaptation to stress? <input type="checkbox"/> <input type="checkbox"/> Anxiety or phobia disorder? <input type="checkbox"/> <input type="checkbox"/> Panic attacks, hyperventilation? <input type="checkbox"/> <input type="checkbox"/> Uncontrollable rage? <input type="checkbox"/> <input type="checkbox"/> Claustrophobia? <input type="checkbox"/> <input type="checkbox"/> Diagnosed Personality disorder or neuroses? <input type="checkbox"/> <input type="checkbox"/> Are you pregnant? <input type="checkbox"/> <input type="checkbox"/> Any history of alcoholism? <input type="checkbox"/> <input type="checkbox"/> Any treatment for alcoholism? <input type="checkbox"/> <input type="checkbox"/> Any history of drug abuse <input type="checkbox"/> <input type="checkbox"/> Any treatment for drug abuse <input type="checkbox"/> <input type="checkbox"/> Use of antiabuse medication? <input type="checkbox"/> <input type="checkbox"/>	EXAMINER: Please comment on all positive historical entries. Comment on all physical abnormalities.
<b>OB GYN</b> Must not be pregnant while diving		
<b>ADDICTIONS</b> Must be free of any drug addiction, including alcohol and the abuse of prescription drugs.		
<b>BREATHING APPARATUS</b> Must be capable of wearing, donning and using all diving related respiratory gear.		
	<b>Medical Questionnaire for Breathing Apparatus Users</b> Have you had or do you now have any of the following: (Use space above to comment a positive entries) 1. Lung disease <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 2. Persistent cough <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 3. Heart trouble <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 4. Shortness of Breath <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 5. History of fainting or seizures <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 6. High blood pressure <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 7. Diabetes <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 8. Fear of light or enclosed places <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 9. Sensation of smothering <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 10. Heat exhaustion or heat stroke <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 11. Ruptured ear drum <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 12. Defective vision <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 13. Defective hearing <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 14. Contact lenses or glasses <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 15. Other conditions that might interfere with respirator use or result in limited work ability <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 16. Are you taking any medications? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/>	
<b>Functional Requirement</b> Must be able to participate and accept all diving tasks and duties.	<b>Diving History</b> How many dives (wet) do you perform per year (on average)? _____ How many chamber dives per year? _____ How deep do you dive, on average? _____ Do you perform moderate or heavy physical labor at depth? Never <input type="checkbox"/> Rarely <input type="checkbox"/> Sometimes <input type="checkbox"/> Usually <input type="checkbox"/> Always <input type="checkbox"/> History of: Decompression sickness _____ Arterial gas embolism _____ Ear barotrauma _____ Pulmonary barotrauma _____ Marine envenomation _____ Disease due to exposure to cold, heat _____	<b>Diagnostic and Physical Findings</b> Have you ever been restricted in your diving duties due to a medical condition? Explain: _____  Have you ever required hyperbaric oxygen therapy? Explain: _____



[illegible]

# Environmental Protection Agency Medical Evaluation Form for Divers

## Specific qualification statement for Breathing Apparatus use

- CLASS:  
(Circle)
1. No restrictions on breathing apparatus use
  2. Some specific use restrictions
  3. No breathing apparatus use permitted

Restrictions:

Medical Review Officer

## Qualification Statement

☐ No Significant Findings - Employee is medically cleared for all diving related tasks and duties, and can participate in a fitness program.

☐ Additional testing required - Final determination cannot be made until the following tests are conducted.

☐ Significant Medical Findings - The reviewing physician has determined that this individual has a medical condition which represents a contraindication for diving.

☐ Findings of a Temporary Nature - Individual is currently unable to perform diving related tasks and duties safely and healthfully. This condition is, however, expected to be temporary and he/she may be qualified in the future.

Medical Review Officer's Signature

Date

Medical Review Officer's Name (print/type)

Client Name

DATE

Appendix B - 7

## Appendix C

### "DIVE SAFE" SHIP OPERATIONS AND CHECKLIST

(Incorporated by Reference: National Maritime Safety Program and NOAA Checklist)



## Appendix D

### Letters of Certification

Appendix D  
EXAMPLE - LETTER OF CERTIFICATION TO DIVE  
Diver Trainee

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
ENVIRONMENTAL RESEARCH LABORATORY  
1 SABINE ISLAND DRIVE  
GULF BREEZE, FLORIDA 32561-5299

SAMPLE

LETTER OF CERTIFICATION TO DIVE

FOR THE ENVIRONMENTAL PROTECTION AGENCY

JOHN Q. DIVER, III

Is Hereby Certified to Dive At The Level Of:

DIVER TRAINEE

AUTHORIZATION: You are authorized to use open-circuit, self-contained underwater breathing apparatus incident to the performance of your official duties, and subject to the prescribed EPA policy and regulations governing the use of such equipment, EPA Directives Manual Chapter 10.

RESTRICTIONS: When diving in unfamiliar conditions, You must be under the supervision of a diver trained and experienced in those conditions.

SPECIAL QUALIFICATIONS: This diver has successfully completed Diving Accident Management.

REMARKS: This diver has completed all requisite classroom work; however, due to a temporary change in physical status, this candidate did not participate in the required field exercises, as a Working Diver, the candidate must demonstrate competence in these field exercises at the EPA Diver Training Facility in Gulf Breeze, Florida.

October 16, 1996

James M. Patrick  
Training Director  
EPA Diving Safety Board

Bruce Reynolds  
Chairman  
EPA Diving Safety Board

EXAMPLE - LETTER OF CERTIFICATION TO DIVE  
Working Diver

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
ENVIRONMENTAL RESEARCH LABORATORY  
1 SABINE ISLAND DRIVE  
GULF BREEZE, FLORIDA 32561-5299

SAMPLE

LETTER OF CERTIFICATION TO DIVE  
FOR THE ENVIRONMENTAL PROTECTION AGENCY

JOHN Q. DIVER, III

Is Hereby Certified to Dive At The Level Of:

WORKING DIVER

AUTHORIZATION: You are authorized to use open-circuit, self-contained underwater breathing apparatus incident to the performance of your official duties, and subject to the prescribed EPA policy and regulations governing the use of such equipment, EPA Directives Manual chapter 10.

RESTRICTIONS: When diving in unfamiliar conditions, you must be under the supervision of a diver trained and experienced in those conditions.

SPECIAL QUALIFICATIONS: This diver has successfully completed diving Accident Management and Dry-suit Training.

REMARKS: The above individual was examined and found technically qualified and psychologically adapted for diving.

October 16, 1996

James M. Patrick  
Training Director  
EPA Diving Safety Board

Bruce Reynolds  
Chairman  
EPA Diving Safety Board

EXAMPLE - LETTER OF CERTIFICATION TO DIVE

Dive Master

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL RESEARCH LABORATORY

1 SABINE ISLAND DRIVE

GULF BREEZE, FLORIDA 32561-5299

SAMPLE

LETTER OF CERTIFICATION TO DIVE

FOR THE ENVIRONMENTAL PROTECTION AGENCY

JOHN Q. DIVER, III

Is Hereby Certified to Dive At The Level Of:

DIVE MASTER

AUTHORIZATION: You are authorized, to use open-circuit, self- contained underwater breathing apparatus incident to the performance of your official duties, and subject to the prescribed EPA policy and regulations governing the use of such equipment, EPA Directives Manual Chapter 10.

RESTRICTIONS: When diving in unfamiliar conditions, you must be under the supervision of a diver trained and experienced in those conditions.

SPECIAL QUALIFICATIONS: This diver has successfully completed Diving Accident Management, Working Diver, Dry-Suit and Dive-Master Training. He is certified to use a Dry-Suit in operational diving and supervise EPA divers.

REMARKS: The above individual was examined and found technically qualified and psychologically adapted for diving.

October 16, 1996

James M. Patrick  
Training Director  
EPA Diving Safety Board

Bruce Reynolds  
Chairman  
Diving Safety Board

## Appendix E

### EXAMPLE - LETTER OF RECIPROCITY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF RESEARCH AND DEVELOPMENT  
ENVIRONMENTAL RESEARCH LABORATORY  
27 TARZWELL DRIVE  
NARRAGANSETT, RHODE ISLAND 02882

Diver Authorization Reciprocity Agreement

Between

The United States Environmental Protection Agency  
Diving Safety Board

and

Florida Department of Environmental Protection  
Florida Marine Research Institute

Unit Diving Officer: Walter C. Jaap

Period of Agreement: November 1, 1994 - October 31, 1995

The EPA Diving Program recognizes the Florida Department of Environmental Protection (FLDEP), Florida Marine Research Institute (FMRI) authorization to dive as equivalent to EPA Authorization. Under this agreement, FLDEP divers who meet FMRI Standards for Scientific Diving (Nov 15, 1991) Section 4.33 are allowed to participate in EPA-sponsored diving projects and operations. Each diver will be required to present a current letter of authorization, signed by the FMRI Diving Officer (UD0). This agreement can only be applied to personnel directly employed by or working under the control of the State of Florida unless agreed upon by both diving programs.

Maintenance of this agreement is contingent upon strict compliance with all EPA diving regulations and standards, when diving on EPA projects, as set forth in the EPA Diving Safety Policy. This policy specifically includes the following: diver certification, annual medical examinations of the divers using the Standard Forms SF-88 and SF-93 and the NOAA medical criteria, annual CPR and first aid certification for divers, periodic inspection and testing of certain pieces of diving equipment, the preparation and approval of a dive plan before each dive, the logging of the details of each dive, the maintenance of diver proficiency and the provision for diver requalification should proficiency lapse, the presence of a qualified divemaster at each dive site. The only exception to standard EPA procedures will be that all certification and medical information will be retained by FMRI.

The EPA Unit Diving Officer for Region IV (Athens, Georgia), Donald Lawhorn, will be the point of contact. Please contact him at (706) 546-2297 if there are any questions regarding diver certification, physicals, operational protocols, or technical procedures. Compliance with the terms of this agreement as well as actual diving activities are subject to on-site action by the EPA Diving Safety Board. This agreement may be terminated or modified by the DSB at any time. This agreement may be renewed annually by mutual consent of both diving programs.

Bruce Reynolds  
Chairman, EPA Diving Safety Board

October 16, 1994

Attachments: EPA Diving Safety Policy  
EPA Diving Medical Examination Forms (or Standard Forms SF-88 and SF-93 with NOAA Medical Criteria)

Appendix F

EPA DIVE LOG

## Appendix F

### EPA DIVE LOG

The designated project divemaster is responsible for completing a log which includes the following:

- (1) dive location,
- (2) dive platform/staging area designation (e.g., boat or dock)
- (2) conditions (sea state, air and water temperatures, current and visibility),
- (3) diver roster and individual responsibility during the diving activity
- (4) dive in-water entry and exit times,
- (5) bottom times, and
- (6) maximum depths.

Personal logging of dive entries currently takes the form of spreadsheets such as Excel® and Lotus 1-2-3®, EPA provided waterproof logbooks, and a logging program currently under development (as of 10/1/95) by the Diving Safety Board.



# DIVE TENDER'S FIELD LOG

Date:

Location:

Divemaster:

Diving Platform:

Site Description:

DIVER	TENDER	TANK PRESSURE		TIME		TOTAL BOTTOM TIME	MAX DEPTH feet
		IN	OUT	IN	OUT		

Dive Notes (*jobs completed, problems encountered, etc.*):

---

---

Emergency Information:

1. Call Laboratory on radio

2. Give receptionist exact location and details of emergency

3. Tell him/her to **DIAL 911** & Respond to dive platform location
- Diver Alert Network (919) 684-8111

Narragansett Rescue 789-1011

South County Hospital Emergency Room 782-8010

US Coast Guard VHF Channel 16
- Recompression Chambers:

U.S. Navy Sub Base Groton: (203) 449-3676

City Island, New York: (718) 720-4994

Norwalk Hospital: (203) 852-2484

MGH, Boston: (617) 573-4411

## Appendix G - EPA Dive Program Report

(Note: Use Region X computer based diver tracking system as the principal reporting media as available. The attached paper reporting system may be used if no other reporting system is available.)

<div>EPA FORM DSB-QDR (9-95)</div> <div>UNITED STATES ENVIRONMENTAL PROTECTION AGENCY</div> <div>UNIT ANNUAL DIVING REPORT</div>				NAME---(Last, First, Middle Initial)				SOC. SECURITY NO.			
				Region I-II-III-IV-V-VI-VII-VIII-IX-X Other Unit:		UNIT DIVING OFFICER		DIVER STATUS(Notes 1)		DATE (mo/yr)	
<div>INSTRUCTIONS</div> <div>1. Use a separate line for each dive. Print all information</div> <div>2. Log repetitive dives using the date, a decimal point and consecutive numbers (ex. three dives on the 15th would be 15.1, 15.2, 15.3).</div> <div>3. Use notes provided to code information on the form.</div> <div>Submit this report to the Unit Diving Officer by the 5th of the month for the preceding month.</div> <div>4. The Unit Diving Officer shall forward a copy of this report to the EPA DSB Chairman.</div> <div>5. A negative report is required.</div> <div>6. For saturation missions, log all excursions as dives using all columns if applicable.</div>				<div>NOTES</div> <div>1. 1 Trainee; 2 Working; 3 Divemaster; 4 Non-EPA (identify)</div> <div>2. 1 Nonsaturation; 2 Saturation; 3 Saturation Support (includes all dives necessary to support a saturation mission--prior to, during, and after)</div> <div>3. 1 Biological Survey; 2 Geological Survey; 3 Oceanographic Survey; 4 Physiological; 5 Maintenance/Repair; 6 Search/Recovery; 7 Test /Evaluation; 8 Training; 9 Non-duty</div> <div>4. 1 Shore; 2 Small Boat; 3 Ship; 4 Diving bell; 5 Submersible; 6 Habitat; 7 Chamber; 8 Pool/Tank</div> <div>5. 1 Open circuit SCUBA; 2 Closed Circuit SCUBA; 3 Umbilical supplied; 4 Snorkel or Skin-diving</div> <div>6. 1 Air; 2 Helium-Oxygen; 3 Nitrox or Enhanced Air Mixture [EAX], indicate % oxygen, (e.g. 32% oxygen EAX32); 4 Oxygen</div>							
<div>7. LOCATION CODES</div> <div>NAC: North Atlantic Coastal--Maine through Rhode Island</div> <div>MAC: Mid-Atlantic Coastal--Connecticut through Virginia</div> <div>SAC: South Atlantic Coastal--North Carolina through southeast Florida</div> <div>GMC: Gulf of Mexico--southwest Florida through Texas</div> <div>PVC: Puerto Rico and U.S. Virgin Islands</div>				<div>AKC: Alaska Coastal</div> <div>NPC: North Pacific Coastal--Washington through Oregon</div> <div>MPC: Mid Pacific Coastal--northern through central California</div> <div>SPC: South Pacific Coastal--southern California</div> <div>HIC: Hawaii Coastal</div> <div>PTT: Pacific Territories and Trustees</div>				<div>GLW: Great Lake Waters</div> <div>OIW: Other Inland Waters</div> <div>FCW: Foreign Coastal Waters</div> <div>DOW: Deep Ocean Waters--beyond the Continental Shelf</div> <div>OTH: Other</div>			
DAY	TYPE OF DIVE (note 2)	PURPOSE OF DIVE (note 3)	DIVE PLATFORM (note 4)	EQUIPMENT (note 5)	BREATHING MEDIA (note 6)	MAXIMUM DEPTH (feet)	BOTTOM OR EXCUR. TIME (minutes)	DECOMPRESSION TIME (minutes)	LOCATION OF DIVE (note 7)	REMARKS AND CONDITIONS ENCOUNTERED	
SATURATION OPERATION DATES (Mo/Day-Mo/Day)		FACILITY USED		BREATHING MEDIA (note 6)	SATURATION DEPTH (feet)	SATURATION TIME (Days/Hours)		DECOMPRESSION TIME (Days/Hrs/Min)		LOCATION OF FACILITY (note 7)	OPERATION NAME AND REMARKS

EPA FORM DSB-UQDR (9-95), NOTE: REGION X reporting software should be substituted as available.

Appendix H -  
Safety Audit Checklist

## Appendix H - Safety Audit Checklist

### Diving Safety Plan and Dive Plan

The Diving Safety Plan and Dive Plan can be two separate documents or they may be combined. The dive plan is specific to the proposed dive operation, and the safety plan can be either a generic plan developed by the dive unit or simply a copy of the Diving Safety Policy, the U.S. Navy Decompression Tables, and area specific emergency information. The elements of each plan are combined in the following checklist.

#### A. EMERGENCY INFORMATION

1. Was the nearest medical facility (i.e., hospital or clinic) identified?  
☐ YES ☐ NO ☐ N/A; Comments:
2. Was a method of communication with the nearest medical facility established?  
☐ YES ☐ NO ☐ N/A; Comments:
3. Was the nearest operational recompression chamber identified?  
☐ YES ☐ NO ☐ N/A; Comments:
4. Was a method of communication with the recompression chamber established?  
☐ YES ☐ NO ☐ N/A; Comments:
5. Was a method of emergency evacuation identified?  
☐ YES ☐ NO ☐ N/A; Comments:
6. Was a method of communication with the means of emergency transportation established?  
☐ YES ☐ NO ☐ N/A; Comments:
7. Are the Divers Alert Network (DAN) telephone numbers, (919) 684-2948 or (919) 684-8111, for medical advice and locations of recompression chambers listed?  
☐ YES ☐ NO ☐ N/A; Comments:
8. Is a copy of the EPA's Diving Safety Policy readily available at the dive site to address unanticipated events or procedural issues?  
☐ YES ☐ NO ☐ N/A; Comments:

B. PROJECT SPECIFIC INFORMATION

1. Did the dive plan describe the proposed dive project?  
☐ YES ☐ NO ☐ N/A; Comments:
2. Were the objectives of the proposed dive project clearly identified?  
☐ YES ☐ NO ☐ N/A; Comments:
3. Were the potential hazards identified?  
☐ YES ☐ NO ☐ N/A; Comments:
4. Were the potential sources of pollution identified?  
☐ YES ☐ NO ☐ N/A; Comments:
5. Were other environmental conditions identified and discussed in the dive plan?
  - a. tidal heights ☐ YES ☐ NO ☐ N/A; Comments:
  - b. water currents ☐ YES ☐ NO ☐ N/A; Comments:
  - c. max. dive depth ☐ YES ☐ NO ☐ N/A; Comments:
  - d. in-water visibility ☐ YES ☐ NO ☐ N/A; Comments:
  - e. weather ☐ YES ☐ NO ☐ N/A; Comments:
  - f. boat/vessel traffic ☐ YES ☐ NO ☐ N/A; Comments:
6. Were the divers, boat operators, and support personnel identified in the plan?  
☐ YES ☐ NO ☐ N/A; Comments:
7. Has the dive plan been approved by the Unit Diving Officer?  
☐ YES ☐ NO ☐ N/A; Comments:

## II. PREDIVE BRIEFING AND ACTIVITIES

The project leader and divemaster for the dive should gather all project personnel together just before diving operations are to start and review the following topics.

1. Was there a review of emergency evacuation procedures?  
☐ YES ☐ NO ☐ N/A; Comments:
2. Was there a review of diving accident management and emergency equipment (e.g., first aid and oxygen kits)?  
☐ YES ☐ NO ☐ N/A; Comments:
3. Were any safety protocols for the dive reviewed (e.g., a safety stop at 15 ft. for dives deeper than 60 ft., buoy line descent/ascent, low air supply procedures/alternate air source use)?  
☐ YES ☐ NO ☐ N/A; Comments:
4. Were the diver-to-diver and tender-to-diver communication procedures reviewed?  
☐ YES ☐ NO ☐ N/A; Comments:
5. Was there a review of the project description and objectives?  
☐ YES ☐ NO ☐ N/A; Comments:
6. Was there a review of the potential hazards:
  - a. Pollution sources?
  - b. Environmental conditions: waves/strong currents/visibility?☐ YES ☐ NO ☐ N/A; Comments:
7. Were decontamination materials available and decontamination procedures reviewed for polluted water diving operations?  
☐ YES ☐ NO ☐ N/A; Comments:
8. Was there a review of any specialized equipment for the dive (e.g., pinger, pinger locator, current meters, ROVs, dive sleds, oxygen meters for Nitrox )?  
☐ YES ☐ NO ☐ N/A; Comments:
9. Were the dive team roles identified (i.e., divemaster, alternate divemaster, tender, and if needed, standby diver)?  
☐ YES ☐ NO ☐ N/A; Comments:
10. Did the divers check all of their dive equipment prior to each dive?  
☐ YES ☐ NO ☐ N/A; Comments:

11. Were the tank pressures checked and recorded before each diver entered the water and subsequent dive start times by the divemaster or tender?  
☐ YES ☐ NO ☐ N/A; Comments:
12. Was the personal emergency information available for each diver (e.g., medical history, family notification)?  
☐ YES ☐ NO ☐ N/A; Comments:
13. Was vessel traffic control notified, if necessary?  
☐ YES ☐ NO ☐ N/A; Comments:



### III. OPERATIONS DURING THE DIVE

During the dive it is important to observe the position of the support vessel(s), operation of the equipment, and the topside diving personnel.

1. Was the tender monitoring the divers and not performing another function that could interfere with tending responsibilities?  
☐ YES ☐ NO ☐ N/A; Comments:
2. Was the support vessel clear of the diving area?  
☐ YES ☐ NO ☐ N/A; Comments:
3. Were the appropriate dive flags displayed on the vessel tending the divers?
  - a. red/white "diver down" flag on inland/coastal waters?
  - b. r/w flag and blue/white code alpha flag in waters with international vessel traffic?☐ YES ☐ NO ☐ N/A; Comments:
4. Were the size of the dive flags appropriate for the diving operation?  
☐ YES ☐ NO ☐ N/A; Comments:
5. Was a standby diver equipped and ready to provide immediate assistance?  
☐ YES ☐ NO ☐ N/A; Comments:
6. Was a tender-to-diver communication system deployed (i.e., diver recall unit)?  
☐ YES ☐ NO ☐ N/A; Comments:
7. Were the emergency first aid and oxygen kits readily available to the diving personnel?  
☐ YES ☐ NO ☐ N/A; Comments:

#### IV. POST-DIVE PROCEDURES

Monitoring post-dive diving operations is important to ensure that divers are taking the necessary precautions to avoid injury, protect themselves from environmental conditions, and maintain their equipment.

1. Did the divemaster and/or tender monitor each diver exiting the water for signs and symptoms of "bubble trouble".  
☐ YES ☐ NO ☐ N/A; Comments:
2. Were the divers protecting themselves from hypothermia or hyperthermia?  
☐ YES ☐ NO ☐ N/A; Comments:
3. Was freshwater (or other appropriate fluids) available to prevent dehydration?  
☐ YES ☐ NO ☐ N/A; Comments:
4. Were the water depths, bottom time, and tank pressures of each diver recorded after each dive?  
☐ YES ☐ NO ☐ N/A; Comments:
5. Was a dive report prepared that included appropriate information specific to the diving operation (e.g., water depths and bottom times for the dives, tank pressures, achievement of objectives, hazards encountered, malfunctions and lost equipment)?  
☐ YES ☐ NO ☐ N/A; Comments:
6. Were appropriate decontamination procedures followed when diving in polluted waters?  
☐ YES ☐ NO ☐ N/A; Comments:
7. Did the divers properly clean and store their equipment when they were not diving or after they had completed the diving operations?  
☐ YES ☐ NO ☐ N/A; Comments:

## V. DIVING PERSONNEL

An evaluation of the training, background, and capabilities of each diver involved in the diving operation is of primary importance.

1. Were all divers current with diving physical examinations (within one year)?  
☐ YES ☐ NO ☐ N/A; Comments:
2. Were all divers current with CPR certification (within one year)?  
☐ YES ☐ NO ☐ N/A; Comments:
3. Were all divers current with first aid training (within 3 years)?  
☐ YES ☐ NO ☐ N/A; Comments:
4. Were all divers trained in oxygen administration (initial training only required)?  
☐ YES ☐ NO ☐ N/A; Comments:
5. Were all divers certified for their respective levels of responsibility (i.e., as Working Divers or Divemasters)?  
☐ YES ☐ NO ☐ N/A; Comments:
6. Had all divers maintained their proficiency (i.e., dived within the last three months)?  
☐ YES ☐ NO ☐ N/A; Comments:
7. Were all divers experienced with the working conditions that were expected during the project?  
☐ YES ☐ NO ☐ N/A; Comments:
8. If the answer to nos. 4 or 5, above, is negative, what provisions and preparations has the divemaster undertaken to prepare the diver for the new situation?  
☐ YES ☐ NO ☐ N/A; Comments:
9. Were all divers using the air compressor, trained in its operation, if one was at the dive site?  
☐ YES ☐ NO ☐ N/A; Comments:

## VI. DIVE EQUIPMENT

Diving equipment must be maintained according to the requirements in the Diving Safety Policy, the manufacturers specifications, whichever are the most conservative.

### A. SCUBA EQUIPMENT

1. Were all SCUBA cylinders tested within the 5-year hydrostatic test date?  
☐ YES ☐ NO ☐ N/A; Comments:
2. Had all SCUBA cylinders been visually inspected within the past 12 months?  
☐ YES ☐ NO ☐ N/A; Comments:
3. Were all regulators critically examined, calibrated, or overhauled within the past 18 months?  
☐ YES ☐ NO ☐ N/A; Comments:
4. Had all of the diver's gauges (e.g., pressure, depth, compass, bottom timers, and watches) been critically examined and calibrated or replaced within the past 18 months?  
☐ YES ☐ NO ☐ N/A; Comments:
5. Had all valves and hoses been critically examined and replaced or overhauled as needed?  
☐ YES ☐ NO ☐ N/A; Comments:
6. Were all belts and buckles in good condition?  
☐ YES ☐ NO ☐ N/A; Comments:
7. For polluted water diving, were all dry suits leak-free?  
☐ YES ☐ NO ☐ N/A; Comments:
8. For wet suit diving, were all buoyancy compensators in good condition and maintained in accordance with manufacturers specifications?  
☐ YES ☐ NO ☐ N/A; Comments:
9. Were all buoyancy compensators capable of being inflated by two methods (one other than oral)?  
☐ YES ☐ NO ☐ N/A; Comments:
10. Had the diver communication equipment been checked prior to use?  
☐ YES ☐ NO ☐ N/A; Comments:

11. Was a dive ladder available for the divers to enter the tending vessel? (Some boats are low to the water or have swim step and do not require a dive ladder.)  
☐ YES ☐ NO ☐ N/A; Comments:
12. Was hygienic maintenance performed on all full-face masks?  
☐ YES ☐ NO ☐ N/A; Comments:
13. Were all full-face masks free of corrosion and in good operating condition?  
☐ YES ☐ NO ☐ N/A; Comments:
14. Were the head harness and buckles in good condition?  
☐ YES ☐ NO ☐ N/A; Comments:
15. Were the manufacturers repair and maintenance manuals available for the specialized dive equipment (e.g., the communication equipment, and full-face masks)?  
☐ YES ☐ NO ☐ N/A; Comments:
16. Was the dive equipment, in general, free of corrosion and in good working condition?  
☐ YES ☐ NO ☐ N/A; Comments:
17. Were adequate spare parts and repair materials available at the dive site?  
☐ YES ☐ NO ☐ N/A; Comments:

**B. FIRST AID EQUIPMENT**

1. Was the emergency oxygen kit capable of servicing two divers with demand second stage regulators at the same time?  
☐ YES ☐ NO ☐ N/A; Comments:
2. Did the emergency oxygen kit have an oxygen cylinder that was size "E" (626 liters) or larger?  
☐ YES ☐ NO ☐ N/A; Comments:
3. Had the regulator on the oxygen cylinder been maintained according to the manufacturers specifications?  
☐ YES ☐ NO ☐ N/A; Comments:
4. Did the oxygen kit contain a cylinder wrench (or wheel) for opening and closing the tank valve?  
☐ YES ☐ NO ☐ N/A; Comments:

5. Were the hoses, valves, and regulators in the oxygen kit in good condition and clean, particularly of oil and grease?  
☐ YES ☐ NO ☐ N/A; Comments:
6. Were the oxygen cylinders within 5-year hydrostatic test date?  
☐ YES ☐ NO ☐ N/A; Comments:
7. Were the valve seats and [washer seal(s)] (on the valve) in good condition?  
☐ YES ☐ NO ☐ N/A; Comments:
8. Was the oxygen cylinder stored in an area where the temperature may exceed 125 degrees Fahrenheit?  
☐ YES ☐ NO ☐ N/A; Comments:
9. Was there a fully equipped medical (first aid) kit for divers?  
☐ YES ☐ NO ☐ N/A; Comments:
10. Were spare oxygen [washer seals] available?  
☐ YES ☐ NO ☐ N/A; Comments:
11. Was there a backboard for emergency use on board the survey vessel?  
☐ YES ☐ NO ☐ N/A; Comments:

TAB VIII

STANDARD OPERATING PROCEDURES

and

STANDARD METHODS

TAB VIII  
STANDARD OPERATING PROCEDURES AND STANDARD METHODS

STANDARD OPERATING PROCEDURES

A.	Nitrox (oxygen enriched air) Diving (Minimum Standards for Use) . . . . .	VIII-1
B.	Polluted/Contaminated Water Diving and Equip. Decon. . . . .	VIII-4
C.	Underwater Pinger/Locator Use . . . . .	VIII-4
D.	Underwater Communications . . . . .	VIII-4
E.	High Altitude Diving > 1000 ft. . . . .	VIII-4

STANDARD METHODS



TAB VIII

PART A

NITROX Diving Standards

## MINIMUM EPA STANDARDS FOR THE USE OF OXYGEN ENRICHED AIR (NITROX) FOR DIVING OPERATIONS

Minimum EPA standards for the use of oxygen enriched air for EPA sanctioned diving operations are listed below.

1. A dive plan designating a divemaster, trained and certified in the use of oxygen enriched air, must be approved by the Unit Diving Officer (UDO).
2. All EPA and EPA-sanctioned divers who use oxygen enriched air shall be trained and certified by a nationally recognized organization approved by the UDO.
3. Personnel blending or filling high-pressure storage or SCUBA cylinders and operating high-pressure gas transfer equipment with oxygen enriched air shall be trained and certified to perform these operations by a nationally recognized organization approved by the UDO. Gas blending must occur prior to filling SCUBA cylinders or contact with breathing equipment (e.g., an open-circuit regulator). Pre-mixed oxygen enriched air or Nitrox may be purchased from a licensed, commercial supplier that provides breathing quality gas in accordance with nationally recognized consensus standards.
4. All gas blending and transfer equipment and storage cylinders shall be cleaned and maintained for oxygen service in accordance with nationally recognized consensus standards. This is required only for equipment that may be exposed to oxygen concentrations equal to or greater than 40%.
5. High-pressure SCUBA cylinders containing oxygen enriched air shall be color-coded and labeled. The cylinders must be yellow with a 4-inch oxygen green band that extends down from the bottom of the curve at the top of the tank. Each cylinder must have "Oxygen Enriched Air Only" or "Nitrox Only" in 1-inch oxygen green letters running the length of the cylinder starting 5 inches from the bottom of the tank. Cylinders marked in accordance with a nationally or internationally recognized Nitrox association may also be used; however, all EPA cylinders will be marked as described above.
6. Two different oxygen analyzers calibrated in accordance with manufacturers' recommendations, must be used to measure the oxygen content of the gas prior to use. The initial measurement shall be taken by the gas vendor or supplier. The second measurement shall be immediately prior to the use of the cylinder. The diver using the cylinder must measure the oxygen content and record the measurement and the SCUBA tank serial number on the dive tender's log. The diver will also initial this entry.
7. Oxygen enriched air, containing  $32 \pm 1$  % oxygen (i.e., NOAA Nitrox I) with the balance of the gas being mainly nitrogen, is a standard breathing gas mixture. The normal depth limit

for use of this mixture shall be 130 feet of seawater for dives that do not require decompression. The gas mixture must be of breathing quality in accordance with nationally recognized consensus standards.

8. Oxygen enriched air, containing  $36 \pm 1$  % oxygen (i.e., NOAA Nitrox II) with the balance of the gas being mainly nitrogen, is a standard breathing gas mixture. The normal depth limit for use of this mixture shall be 110 feet of seawater for dives that do not require decompression. The gas mixture must be of breathing quality in accordance with nationally recognized consensus standards.

9. When diving with oxygen enriched air, divers shall use diving and decompression tables calculated for the specific gas mixture used (e.g., NOAA Nitrox I or II Diving and Decompression Tables).

10. Oxygen enriched air exceeding 37% oxygen shall not be used for EPA diving operations.

**NITROX Reference:**

Nitrox Manual; Complete Guide to Nitrox Diving -- by: Dick Rutkowski © 1994; Hyperbarics International; 490 Caribbean Drive; Key Largo, FL 33037

AAUS Recommendations and Guidelines for Scientific Nitrox Diving and Nitrox Diver Certification, September 1991

**B. Polluted/Contaminated Water Diving and Equipment Decontamination**

**Reference A:**

NTIS Document: # PB86-128022  
EPA Report No.: EPA/600/2-85/130  
Interim Protocol for Diving Operations in Contaminated Water  
U. S. Environmental Protection Agency  
Cincinnati, OH  
Nov. '85

**Reference B:**

US EPA STANDARD OPERATING PROTOCOL  
BIOHAZARDS OF DIVING OPERATIONS AND AQUATIC ENVIRONMENTS  
Prepared in Conjunction with the  
NATIONAL UNDERWATER DIVING SAFETY MANAGEMENT PROGRAM  
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AMERICAN ACADEMY OF UNDERWATER SCIENCES  
Dedicated to the advancement of scientific diving

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RECOMMENDATIONS AND GUIDELINES FOR SCIENTIFIC  
NITROX DIVING AND NITROX DIVER CERTIFICATION

The American Academy of Underwater Sciences

September 1991

AAUS 947 Newhall Street Costa Mesa California 92627

## FOREWORD

It is the intent of these Recommendations And Guidelines to be supplemental to the American Academy of Underwater Sciences (AAUS) "Standards for Scientific Diving Certification and Operation of Scientific Diving Programs" manual (Second Revision October 1990), and to serve as a basis on which a sound and safe Scientific Nitrox Diver Training and Certification program can be established. These Guidelines and Recommendations are meant to identify needs, concerns and considerations involved with Nitrox diving systems and operations, as well as to assist in assuring a program based on the most up-to-date safe diving practices. These Recommendations and Guidelines are not all inclusive, and those organizations wishing to establish a Nitrox program should consult with individuals active and knowledgeable in the physical, physiological and operational aspects of Nitrox diving.

Board of Directors, American Academy of Underwater Sciences  
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## SECTION 1.00

These recommendations and guidelines for Scientific Nitrox Diving Standards are supplemental to those specified in the AAUS "Standards for Scientific Diving Certification and Operation of Scientific Diving Programs" manual (hereinafter referred to as the "AUS Standards Manual"). All procedures and requirements of the AAUS Standards Manual are in effect under these guidelines unless specifically modified or exempted herein.

### 1.10 Prerequisites.

### 1.11 Eligibility.

Only a certified Scientific Diver or Nitrox Diver-in-Training (DIT) diving under the auspices of a member organization is eligible for certification as a Scientific Nitrox Diver. After completion, review and acceptance of application materials and qualifications as per Secs. 1.12-1.14 of these guidelines, an applicant will be considered a Nitrox-DIT.

### 1.12 Application.

Application for Nitrox certification shall be made to the Diving Safety Officer (DSO), or his designate, on the form prescribed by the member organization's Diving Control Board (DCB).

### 1.13 Medical Examination.

Each applicant for Scientific Nitrox Diver certification shall submit a statement from a licensed physician, based on an approved medical examination (as per Sec. 7.00 (MEDICAL STANDARDS) of the AAUS Standards Manual), attesting to the applicant's fitness for diving. All divers shall be re-examined on a periodic basis. The periodicity shall be at least as frequent as outlined in Sec. 7.00 of the AAUS Standards Manual. An Oxygen Tolerance Test is optional at the discretion of the DCB.

### 1.14 Qualifications.

The individual must hold an active Scientific Diver certification, or its equivalent, or demonstrate to the satisfaction of the DSO and DCB, an acceptable level of proficiency in necessary skills and theory relevant to Nitrox diving, and adequate diving experience.

It is recommended that candidates for Nitrox certification document experience of at least 25 logged open-water scuba dives using compressed air.

### 1.20 Requirements for Scientific Nitrox Diver Certification.

Submission of documents and participation in aptitude examinations does not automatically result in certification as a Scientific Nitrox Diver. The applicant must convince the DSO and members of the DCB that he/she is sufficiently skilled and proficient to be certified. The skills will be acknowledged by the signature of the DSO on the certification form. After completion of Nitrox Diver training and evaluation, Nitrox diving certification may be denied to any applicant who does not demonstrate, to the satisfaction of the DSO or DCB, the appropriate judgment or proficiency to ensure the safety of the diver and dive buddy. Minimum certification documentation and examinations required are as follows:

### 1.21 Documentation.

The applicant will provide to the DSO, for review by the DCB, the following:

1. A completed application on the form prescribed by the DCB;
2. Proof of recent (within 1 year) exam attesting to the applicant's fitness (as per Sec. 7.00; AAUS

- Standards Manual, for diving;
- 3. Proof of Scientific Diver certification or equivalent,
- 4. Diving experience.

#### 1.22 Training.

The diver must complete additional theoretical and practical training beyond the Scientific Diver air certification level to the satisfaction of the member organization's DSO and DCB (See Section, 3.0).

#### 1.23 Examinations.

Each Nitrox DIT shall demonstrate proficiency in skills and theory in written, oral and practical examinations covering:

1. Written examinations covering the information presented in the classroom training session(s) (i.e., gas theory, oxygen toxicity, partial pressure determination, etc.);
2. Practical examinations covering the information presented in the practical training session(s) (i.e., Nitrox gas analysis, mixing procedures, etc.);
3. Open water checkout dives to appropriate depths, to demonstrate the application of theoretical and practical skills learned.

#### 1.24 Waiver of Requirements.

The DSO and the DCB may grant a waiver for specific requirements of training and experience for applicant certification if evidence of qualifying knowledge and experience for Nitrox diving can be demonstrated.

#### 1.25 Temporary Certification.

Requirements of Secs. 1.21 and 1.22 (with the exception of Sec. 1.21.2) may be waived by the DSO if the person seeking a temporary certification has demonstrated proficiency in Nitrox diving and can contribute measurably to a planned dive operation. A statement of the temporary diver's qualifications and other supportive material (i.e., medical approval) shall be submitted to the DSO as part of the dive plan or as per protocol outlined in the organization's Diving Standards Manual. Temporary certification shall be restricted to the planned diving operation(s) and shall comply with all other policies, regulations, and standards of these recommendations and the AAUS Standards Manual.

#### 1.26 Minimum Activity to Maintain certification.

During any twelve (12) month period, each certified Nitrox diver must log a minimum of twelve (12) dives, with at least one (1) dive every six months within the divers maximum certification depth range. Additionally, at least one (1) Nitrox dive must be logged every 6 months. Failure to meet the minimum activity criteria may be cause for revocation or restriction of Nitrox and/or air scuba certification.

#### 1.27 Revocation of Certification.

A diving certification may be revoked or restricted for cause by the DSO or the DCB. Violations of regulations set forth in this manual or violations of the member organization's diving manual may be considered cause for revocation. The DSO shall inform the diver in writing of the reason(s) for revocation or restriction. The diver will be given the opportunity to present their case in writing to the DCB for reconsideration and/or recertification. All such written statements, requests, and findings, as identified in this section, are formal documents which will become part of the diver's permanent file.

#### 1.28 Recertification.

If a diver's certification expires or is revoked, the diver may be recertified after complying with such conditions as the DCB may impose. The diver shall be given an opportunity to present their case to the DCB before conditions for recertification are stipulated. At a minimum, the diver will demonstrate, to the satisfaction of the DSO and DCB, competence in the theoretical and practical of Nitrox diving, and meet all other recertification requirements of the organizations Diving Standards Manual.

#### 1.30 Requirements for Nitrox Divemaster Certification.

Submission of documents and participation in aptitude examinations does not automatically result in certification. The applicant must convince the DSO and members of the DCB that he/she is sufficiently skilled and proficient to be certified. The skills will be acknowledged by the signature of the DSO. Upon evaluation by the DSO or the DCB, any applicant who, under diving conditions, does not demonstrate the necessary skills, knowledge or judgment for the safety of the diver(s) under their supervision, authority or control, may be denied member organization Nitrox Divemaster privileges. Minimum documentation and examination required are as follows:

##### 1.31 Documents.

The following documentation shall be submitted to the DSO for review by the DCB.

1. Completed application on form prescribed by the DCB;
2. Proof of recent medical approval for diving as per Sec. 7.00 of the AAUS Standards Manual;
3. Proof of Scientific Diver Certification to a depth range equivalent to the maximal depth that the applicant would be involved in diving operations;
4. Proof of current CPR and first aid certification;
5. Dive logs attesting to experience qualifications (Sec. 1.32.)

##### 1.32 Experience.

The applicant will provide proof of the following minimal requirements for diving experience.

1. A minimum of 100 logged open water scuba dives breathing compressed air;
2. A minimum of twenty-five (25) logged open water scuba dives breathing Nitrox mixtures, including having participated in all mixing and analysis procedures.

##### 1.33 Training.

While the topics associated with the Nitrox Divemaster certification are similar to those for Scientific Nitrox Diver certification, the depth or coverage of the topics will be of greater detail. The training requirements for a Nitrox Divemaster are:

1. Successful completion of a course of instruction in Nitrox diving techniques for users (see Sec. 3.00);
2. Successful completion of a course of instruction in Nitrox for Divemasters. Instruction shall include, but not be limited to: theoretical and practical training in safe handling of oxygen; gas mixing techniques and procedures; gas analysis equipment and techniques; selection and calculation of gas mixtures and decompression tables; dive planning; emergency evacuation procedures; and diving operations management relative to the situations in which the Divemaster will be operating. A Nitrox Divemaster certification will not be given until the applicant has demonstrated, to the satisfaction of the DSO, competency in oxygen handling and safety procedures, gas mixing and analysis techniques.

## SECTION 2.00

### SCIENTIFIC NITROX DIVING REGULATIONS

#### 2.10 Dive Parameters.

#### 2.11 Dive Limitations.

The dive limitations outlined below are based on the partial pressure of oxygen that would be experienced at the maximum depth indicated.

1. The following limitations are to be used for Nitrox diving with NOAA Nitrox-I (32% oxygen) and NOAA Nitrox-II\* (36% oxygen) mixtures:

<u>Nitrox Mixture</u>	<u>Maximum Depth</u>
NOAA Nitrox-I	40 meters (130 feet)
NOAA Nitrox-II	35 meters (110 feet)

\*NOTE: "NOAA Nitrox-II" mixture refers to the Nitrox mixture (64:36; Nitrogen : oxygen) proposed by NOAA.

2. If using the equivalent air depth method, the maximum depth of a dive shall be based on the partial pressure of the oxygen for the specific Nitrox breathing mixture to be used. The oxygen partial pressure experienced at depth shall not exceed 1.6 ATAs.

#### 2.12 Bottom Time Limitations.

Maximum bottom time shall be based on the depth of the dive and the Nitrox air breathing mixture being used.

Bottom time of a single dive shall not exceed the NOAA maximum allowable "Single Exposure Limit" for a given partial pressure of oxygen, as listed in Sec. 2.22.

#### 2.13 Decompression Tables and Gases.

1. The use of standard NOAA decompression tables and procedures, as outlined in the NOAA Diving Manual, when utilizing either NOAA Nitrox-I or NOAA Nitrox- II is strongly recommended.
2. When utilizing the "equivalent air depth" method, dives shall be conducted using decompression tables at least as safe as the U.S. Navy air tables.
3. A set of appropriate decompression tables must be available at the dive site and must be as safe as those established by the U.S. Navy.
4. Breathing gases used while performing in-water decompression, or for bail-out purposes, shall contain that of the same or greater oxygen content as that used during the dive, within the confines of depth limitations of Sec. 2.11 and the oxygen partial pressure limits set forth in Sec. 2.22.

#### 2.14 Repetitive Diving.

1. Repetitive dives using Nitrox mixtures shall be performed in compliance with procedures required of the specific decompression tables used.
2. Residual nitrogen time shall be based on the equivalent air depth for the specific Nitrox mixture to be used on the repetitive dive and not on that of the previous dive.
3. The total exposure (bottom time) to a partial pressure of oxygen in a given 24 hour period shall not exceed the "Total Exposure per 24 Hour Period" (Sec. 2.22).

## 2.20 Oxygen Parameters.

## 2.21 Authorized Mixtures.

1. The following two (2) Nitrox mixtures will provide maximum bottom time for most dives between 60 and 130 feet and are recommended for standard use:
  - a. NOAA Nitrox-I - 32% Oxygen : 68% Nitrogen
  - b. NOAA Nitrox-II - 36% Oxygen : 64% Nitrogen
2. Other mixtures meeting the criteria outline in Secs. 2.11.2 and 2.22, may be - used for Nitrox diving operations upon approval of the DCB.

## 2.22 Recommended Oxygen Partial Pressure Limits.

All dives performed using Nitrox breathing mixtures shall comply with the following NOAA Oxygen Partial Pressure Limits for “normal” exposures:

### OXYGEN PARTIAL PRESSURE LIMITS (NOAA.- PROPOSED)

<u>Max. PPO<sub>2</sub></u> <u>(ATAs)</u>	<u>Single Exposure</u> <u>Limit (mins)</u>	<u>Total Exposure per</u> <u>24 Hour Period (mins)</u>
1.6	45	150
1.5	120	180
1.4	150	180
1.3	180	210
1.2	210	240
1.1	240	270
1.0	300	300

## 2.30 Gas Mixing and Analysis.

## 2.31 Personnel Requirements.

1. Individuals responsible for mixing and analyzing mixtures shall be knowledgeable and experienced in all aspects of the technique.
2. Only those individuals approved by the DSO and/or the DCB shall be responsible for mixing and analyzing mixtures (except as noted in Sec. 2.34).

## 2.32 Equipment Requirements.

Compressors and cascade systems shall meet guidelines outlined in the AAUS Standards Manual (Secs. 5.11 6.20-6.21)

## 2.33 Mixing Methods.

There are a number of methods available to mix nitrogen/oxygen breathing mixtures for use by divers. Each method has certain advantages and disadvantages. It is the responsibility of the DCB to approve the specific mixing method utilized.

## 2.34 Purity Standards.

1. Oxygen used for mixing Nitrox breathing gas shall most the purity levels for “Medical-Grade” (U.S.P.) standards.
2. Air purity shall meet standards as outlined in the AAUS Standards Manual. The use of an “oil-free” or “oil-less” air compressor to further reduce the level of oil mist and vapor is recommended.

3. Nitrogen used to mix Nitrox breathing mixtures shall be of an acceptable grade for breathing by humans.

#### 2.35 Analysis Verification.

1. It is the responsibility of each diver to confirm, by direct observation the oxygen content of his/her scuba cylinder and acknowledge in writing the following dive profile information:
  - a. The target depth and appropriate Nitrox mixture to be used on the dive:
  - b. The maximum depth and bottom time permitted for the mixture contained in his/her scuba cylinder.
2. Nitrox breathing mixtures shall have a metered oxygen content of +/- 1.0% of the desired oxygen percentage.

If a greater variance exists the cylinder will not be used for that dive or, at the DSO's discretion, the dive plan modified to meet the limits and restrictions corresponding to the actual oxygen percentage.

#### 2.40 Termination of Dive.

1. The dive shall be terminated while there is still sufficient tank pressure to permit the diver to safely reach the surface, including any necessary decompression time, or to safely reach additional gas sources at the stop.
2. In the case of surface-supplied diving, the member organization's standards must be followed.

## SECTION 3.00

### RECOMMENDED GUIDELINES FOR SCIENTIFIC NITROX DIVER TRAINING

#### 3.10 Evaluation.

#### 3.11 Medical Examination.

The applicant for training shall be certified by a licensed physician to be medically fit for diving, as per Sec. 7.00 of the AAUS Standards Manual, and any additional requirements deemed necessary by the member organization, before proceeding with Nitrox diver training. An Oxygen Tolerance Test is optional.

#### 3.20 Scuba Training.

This training will be supplemental to the training requirements for scuba in the AAUS Standards Manual and additional training specific to Nitrox scuba.

#### 3.21 Class Instruction.

1. Topics should include, but not be limited to: a review of previous training, gas laws, partial pressures (limits and calculations), equivalent air depth concept and calculation, oxygen toxicity, mixing procedure, calculations for producing specific mixes, gas (or mix) analysis, determination of decompression schedules, personnel requirements, safety procedures, treatment procedures, dive station requirements, dive planning and emergency procedures. The DSO may choose to limit the training to diving-applied procedures and subsequently provide training, such as mixing, oxygen cleaning and dive station related topics to a more advanced level of certification (i.e., Nitrox Divemaster; see Secs. 1.30-1.33 of these guidelines).
2. A minimum of (2) supervised ocean or open water Nitrox dives shall be required for certification. The mode used in the dive shall correspond with the training intentions, (i.e., scuba Nitrox or surface-supplied Nitrox).

The Nitrox training should include (when applicable) theoretical and practical aspects of the use of recompression chambers including but not limited to: location, availability, evacuation plans and transport, and required personnel.

#### 3.22 Practical Training.

The practical portion of the training will consist of a review of skills as stated for scuba in the AAUS Standards Manual with additional training in the following areas:

1. Mixing procedures and techniques to minimize the risks associated with handling 100% oxygen in a high pressure system.
2. Calculations of the equivalent air depth, psi, percentages, and partial pressures of oxygen for various Nitrox mixtures.
3. Oxygen analysis of Nitrox mixtures.
4. Oxygen cleaning of Nitrox fill system and scuba components.
5. Decompression table usage (EAD and NOAA Nitrox tables).

\* Denotes optional material for the individual diver. Some DSOs may do all of the mixing. Therefore, they may choose to only train the divers in applicable areas.

#### 3.23 Written Examination (based on classroom instruction and practical training).

Before completion of training the trainee must successfully pass a written examination that demonstrates



knowledge of at least the following:

1. All items applicable to scuba air operations.
2. Function, care, use, and maintenance of equipment cleaned for Nitrox use.
3. Physical and physiological considerations of Nitrox diving.
4. Diving regulations and procedures as related to Nitrox diving, either scuba or surface-supplied (depending on the intended mode).
5. Causes signs, symptoms, treatment and prevention of: near drowning, arterial gas embolism, decompression and hyperbaric exposure related illness, Anoxia/hypoxia, and oxygen toxicity.
6. Emergency procedures including recognition, assessment, management, in-water emergency techniques and evacuation procedures for the maladies listed above (Sec.3.22.5).
7. Calculations of: equivalent air depth, partial pressure of the gases; breathing gas mixtures and psi of oxygen present in a mix; maximum depth limit for a given mix (i.e., depth at which  $P_{O_2}$  - 1.6 ATA).
8. Decompression table selection and usage.
- \*9. Nitrox mixing methods and considerations.
10. Oxygen analysis.

11. Dive team assignments, dive planning, dive station components.

\* Denotes optional material for the individual diver. Some DSOs may do all of the mixing. Therefore, they may choose to only train the divers in applicable areas.

### 3.30 Surface-Supplied Training.

All training as applied to surface-supplied diving - practical, classroom, and open water - will follow the member organization's surface-supplied diving standards, including additions listed in 3.21 and 3.22.

## SECTION, 4.00

### NITROX DIVING EQUIPMENT

#### 4.10 Nitrox Scuba.

All of the designated the designated equipment and stated requirements regarding scuba equipment required in the AAUS Manual shall apply to a Nitrox scuba operation. Additional equipment necessary for establishment of a Nitrox station are as follows:

Dedicated SCUBA cylinders  
Oxygen cylinders  
Compressor

\* Oxygen analyzers  
Oxygen cleaning supplies

\* Required equipment

#### 4.11 Required Equipment:

1. Dedicated Scuba Cylinders: "Oxygen clean" scuba cylinders shall be marked "NITROX ONLY", and color coded as outlined in Sec. 4.22. The cylinders will be restricted for use with Nitrox mix only. Cylinders not so designated or prepared shall not be used for Nitrox cylinders.

2. Oxygen Analyzers: An oxygen analyzer capable of determining the oxygen content in the diver's scuba cylinder prior to diving is required. The use of two analyzers (in parallel) is strongly recommended for comparative and verification purposes.

#### 4.12 Recommended Equipment:

1. Oil-Free Air Compressor: An oil-free air compressor is strongly recommended when mixing Nitrox using compressed air and oxygen, to reduce the presence of oil mist and help reduce the chances for oxygen ignition of hydrocarbons in a contaminated system. An "oil" compressor, placed in service in for a Nitrox system must be checked for oil and hydrocarbon contamination on a frequent basis.
2. Nitrox Fill Station: It is strongly recommended that a Nitrox fill station be utilized for Nitrox operations. It should be exclusive of other air fill stations, and equipped with oxygen clean fill whips, gauges, valves, etc. This will help maintain system integrity and reduce the cross-mixing (air/Nitrox) potential.

#### 4.20 Cleaning and Maintenance Requirements.

4.21 Diver-Worn and Support Equipment: All diver-worn and support equipment used (in contact) with high pressure oxygen or oxygen mixtures greater than 25 percent by volume should be prepared and maintained for oxygen service in compliance with ASTM Pamphlet G88-84, "Designing Systems for Oxygen Service". Oxygen cleaning when using high pressure oxygen concentrations higher than 40% by volume.

4.22 Nitrox Containers: All containers used for the storing, mixing or dispensing (including scuba cylinders) of Nitrox shall be designated "NITROX ONLY" and color-coded with a green band around the cylinder, beginning at the curvature of the cylinder and extending downward for four (4) inches.

4.23 Scuba Regulators: Scuba regulators can be used with any oil-free breathing gas (air or Nitrox). It is recommended that first stages of scuba regulators that have been used with air derived from an oil lubricated compressor, not be used for Nitrox service.

4.24 Other Equipment: All other diving and auxiliary equipment shall be cleaned, maintained, and stored in compliance with the AAUS Standards Manual.

#### 4.30 Nitrox- Surface Supplied.

All of the designated equipment and stated requirements for surface-supplied equipment shall be conform to the requirements stated in the member organization's standards.

## SECTION 5.00

### DEFINITIONS AND ABBREVIATIONS

AAUS: An abbreviation for the “American Academy of Underwater Science”  
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ATA(s): An abbreviation for "Atmospheres Absolute"; defined as the total pressure exerted on an object, by a gas or gases, at a specific depth or elevation, including normal atmospheric pressure.

DCB: An abbreviation for "Diving Control Board".

DIT: An abbreviation for “Diver-in-training”.

DSO: An abbreviation for "Diving Safety Officer".

EAD: An abbreviation for Equivalent Air Depth (see below).

Enriched Air: The term refers to a breathing mixture of air and oxygen when the percent of oxygen exceeds 21%. This term is considered synonymous with the term "Nitrox”

Equivalent Air Depth: The depth at which air will have the same nitrogen partial pressure as the Nitrox mixture being used. This number, expressed in feet of seawater, will always be less than the actual physical depth for any enriched air mixture.

Nitrox: A gas mixture of nitrogen (or air) and oxygen. For use within the context of these Recommendations and Guidelines, the mixture will have a lower percent concentration of nitrogen than air.

NOAA: National Oceanic and Atmospheric Administration

Oxygen Toxicity: Any adverse reaction of the central nervous system (acute oxygen toxicity) or lungs (pulmonary oxygen toxicity) brought on by exposure to an increased (above atmospheric levels) partial pressure of oxygen.

psi: An abbreviation for the unit of pressure: "pounds per square inch".

U.S.P.: United States Pharmacopoeia, American Medical Association.